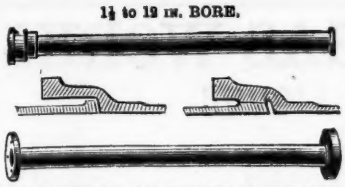
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXI. No. 1554.] LONDON, FEBRUARY 21, 1893. [45TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



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Parker's Imperial Black Varnish,
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Have completed a four-lift Holder nearly 200 feet high, of about 8 MILLION cubic feet, at the Beckton Gas-Works, London.

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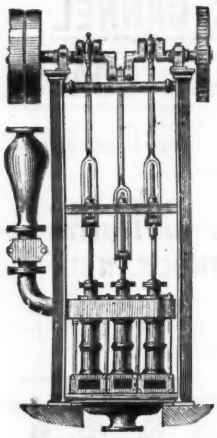

Treble-Barrel Pumps in Frame.

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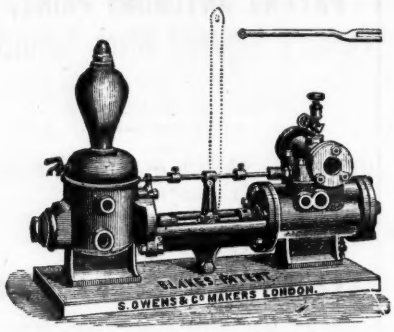
Double-Barrel Force-Pump in Frame.



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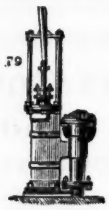

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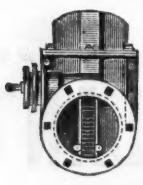

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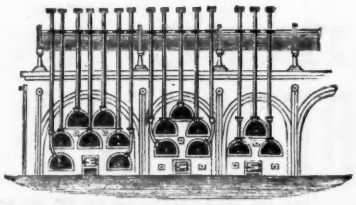

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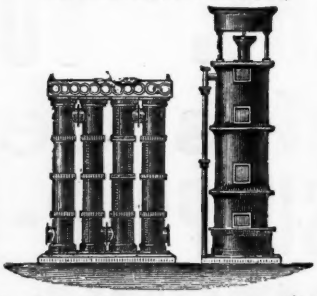

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CENTRE VALVES
for working Purifiers.
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,
WOOD GRIDS.
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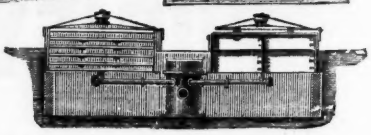

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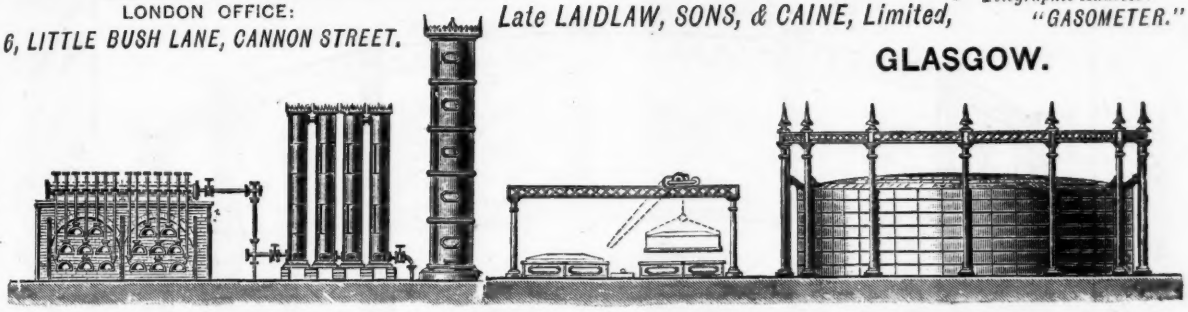

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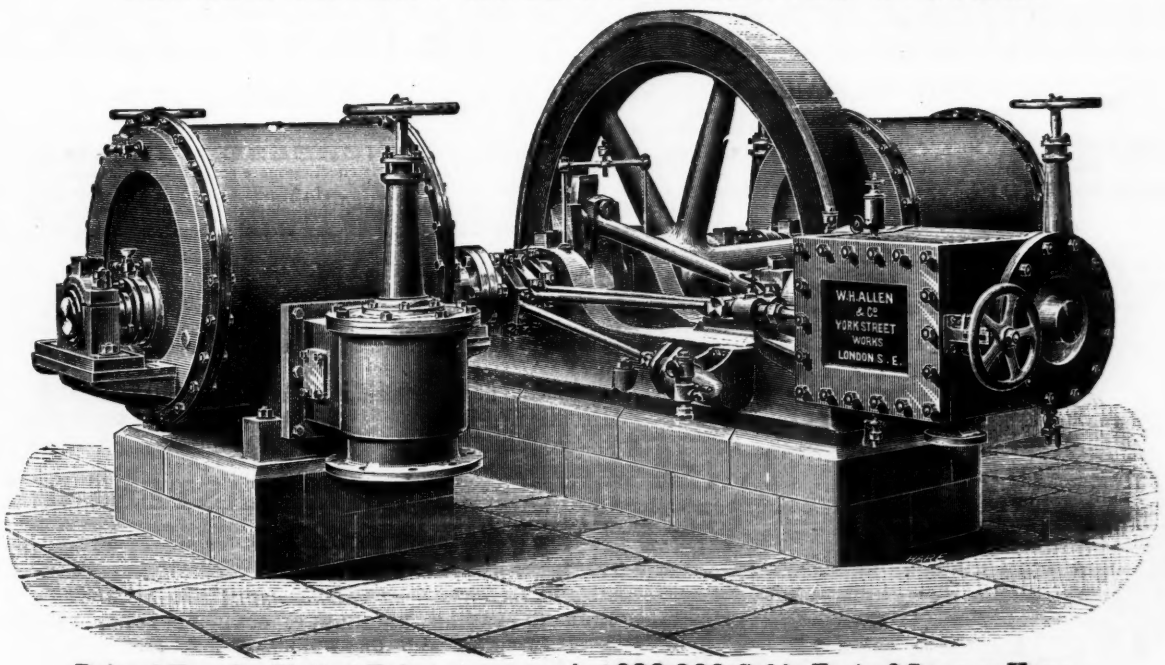

Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

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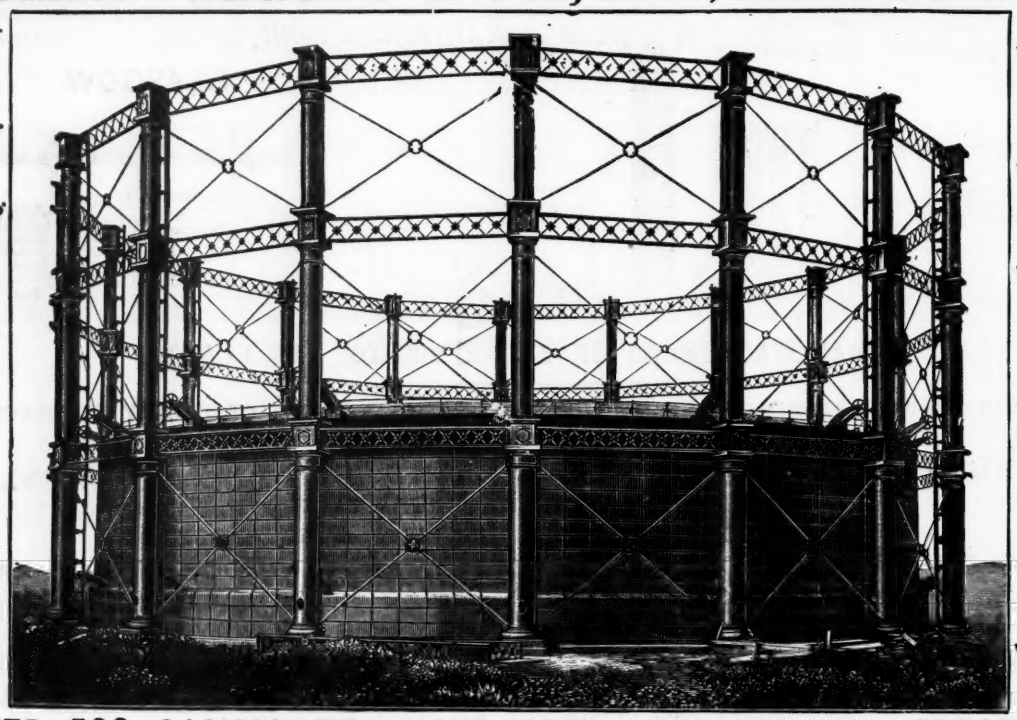

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BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
BIRMINGHAM.	BRIGHTON.	COVENTRY.	LEICESTER.	OLDHAM.	SOUTH METRON.	VIENNA.

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Engineers, Ironfounders, & Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS.

OVER **240** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:—

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by COMPRESSED AIR, STEAM, or ROPE. The power machines are applicable to circular, oval, or ⌂-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

MAKERS OF COAL BREAKING, ELEVATING, AND CONVEYING MACHINERY, COKE BREAKING AND WASHING MACHINERY.

Sole Makers of **CIRCULAR, OVAL,** or ⌂-shaped **MOUTHPIECES** with Morton's Self-Sealing Lids, fitted with

KING'S PATENT FASTENINGS,

secure a very tight joint; and at the same time the eccentric motion given to the Lid effectually removes the Tar from the surfaces of the Joint.

N.B.—The whole of these Fittings are made of Wrought Iron. Several Thousands in use.

West's Improved Combined Regulating Liquor Seal Valve.

OXIDE ELEVATING MACHINERY, COKE BARROWS, VALVES, AND ALL GAS-WORKS PLANT, &c.

Illustrated Catalogue sent upon application.

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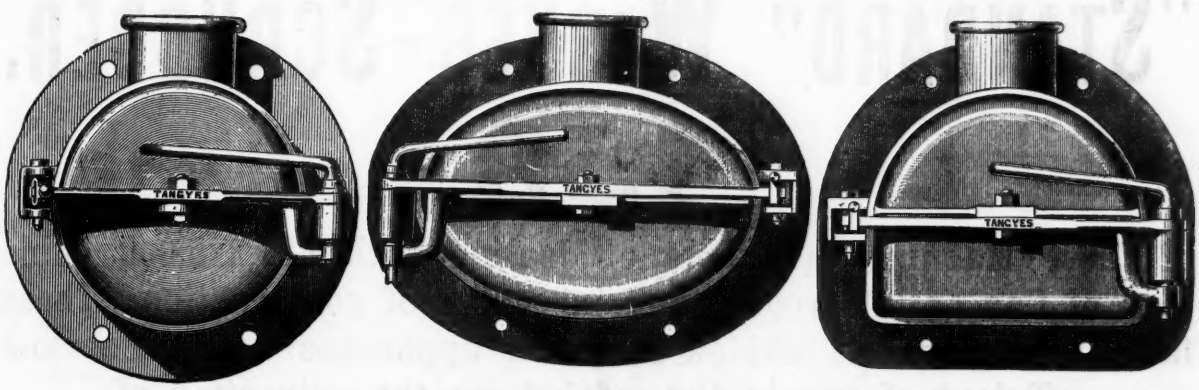
AND AT LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, GENOA, BILBAO, & ROTTERDAM.

MORTON'S SELF-SEALING RETORT-LID,

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



These Retort Lids and Fastenings are made in three forms, round, oval, and ⌂ (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these Lids are recommended to make their selection, in order to avoid cost of pattern-making, delays, &c., &c.

QUOTATIONS WILL BE GIVEN ON RECEIPT OF PARTICULARS OF REQUIREMENTS.

LIST OF PATTERNS ON APPLICATION.

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INCLINED RETORTS,

FIRE BRICKS, LUMPS, TILES, BLOCKS, &c.

Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

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Fire-Brick Works, STOURBRIDGE.

☞ Retort Setters sent to any part of the Kingdom.

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IMPERIAL TUBE WORKS,

WOLVERHAMPTON.

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS FOR GAS, WATER, STEAM, AND ALL OTHER PURPOSES.

Also of IRON and STEEL CYLINDERS for the conveyance of COMPRESSED GAS.

PRICES ON APPLICATION.

KIRKHAM, HULETT, & CHANDLER,

LIMITED.

(SIDNEY HERSEY, Managing Director.) (J. CHANDLER, Engineer.)

PATENT

"STANDARD" WASHER-SCRUBBER.

459

of these Machines (capable of dealing with 437,315,000 cubic feet of Gas daily) erected and in course of construction. These facts are given as evidence of the apparatus being the most efficient of any in the market for the extraction of

AMMONIA, CARBONIC ACID, AND SULPHURETTED HYDROGEN FROM COAL GAS.

A large number of the above Machines have been constructed according to the Company's latest Patent, which has also been applied to original pattern Machines at many Works.

TESTIMONIALS.

The Gaslight and Coke Company,
Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

Gentlemen,

In reply to your inquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.

I am, yours truly,
(Signed) G. C. TREWBY.

NOTE.—Orders since received for four 3,500,000 cubic feet per day Machines for Beckton; and two 3,000,000 cubic feet for Kensal Green, also for Patent Improved Wooden "Bundles" for original pattern Patent "Standard" Washer-Scrubbers erected at Beckton, Nine Elms, Shoreditch, Pimlico, and Bromley.

Extract from the JOURNAL OF GAS LIGHTING, &c., for Sept. 27, 1892, referring to the visit of the Members of the Eastern Counties Gas Managers' Association to the Lowestoft Gas-Works—

"Mr. J. Ayris has one of Messrs. Kirkham, Hulett, and Chandler's "Standard" Washer-Scrubbers in operation (capable of dealing with 500,000 cubic feet of gas per 24 hours); and of the working of this machine he spoke very highly."

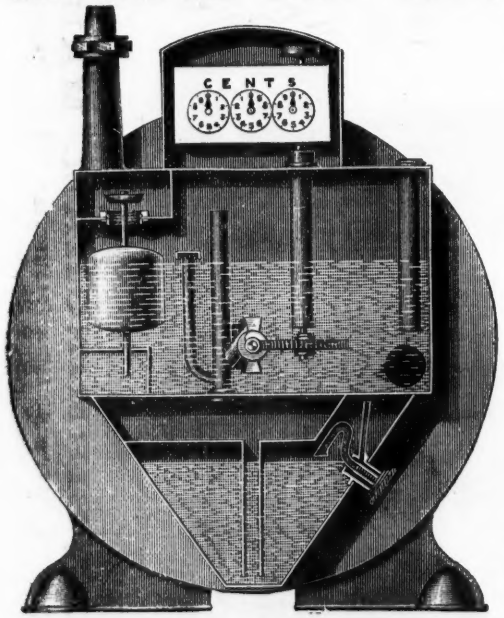
Estimates furnished for cost of altering original pattern Patent "Standard" Washer-Scrubbers, or for the supply of New Machines.

ADDRESS:—

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

THE SYPHON OVERFLOW

— Wm. Cowan's Patent. —



To suppose, as some do, that the main object of the "Syphon Overflow" is to promote the convenience of inspectors and others who "water" meters, is to misapprehend the chief purpose of the invention. That the convenience of inspectors is promoted by the Syphon Overflow is a fact that admits of no doubt whatever, because the watering of meters is thereby greatly facilitated; but it is a mistake to fix attention upon this result, and to regard it as the only one attained. To do this is to lose sight of the chief purposes the Syphon Overflow was designed to secure.

These purposes were—

1st.—The **speedy** attainment of **exactly the same water line** on each occasion of watering.

2nd.—The **absolute certainty** of this water line being attained.

3rd.—The **impossibility** of any water afterwards finding its way into the waste-box.

The first and second of these conditions secure the interests of the gas company, whilst the third greatly promotes the convenience of the consumer, for reasons that are well known.

Who that has had experience of Wet Meters does not know the disadvantages of the "Low Spout?" The slowness with which it adjusts the water line, and the patience required while this is being done, are matters of every-day experience. It is therefore no wonder that the "Syphon Overflow" is regarded as one of the most important improvements ever made in the Wet Gas-Meter. It is not only an important improvement **in itself,** but it possesses the property of making all previous improvements more valuable and effective. It has, indeed, made the Wet Meter a more perfect, and, in every way, a more satisfactory instrument.

Narrow views as to price often prevent the adoption of real improvements; but it would be a narrow view indeed which would prefer a "Low Spouted" Meter to one with a "Syphon Overflow," because of the trifling difference in the price of the two.

— W. & B. COWAN, —

— ESTABLISHED 1827. —

SMITH SQUARE WORKS, WESTMINSTER,
LONDON, S.W.
TELEPHONE No. 3250.
"DISC LONDON."

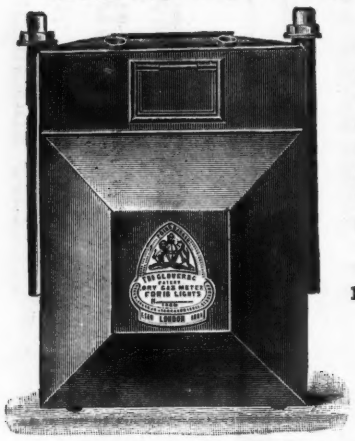
DUTTON STREET WORKS,
MANCHESTER.
TELEPHONE No. 1545.
TELEGRAPHIC ADDRESSES:
"DISC MANCHESTER."

BUCCLEUCH STREET WORKS,
EDINBURGH.
TELEPHONE No. 753.
"DISC EDINBURGH."

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

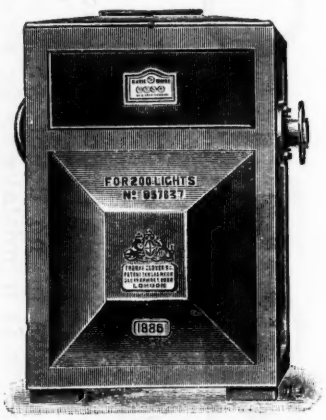
LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;
The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.



Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

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LEEDS BOAR LANE CHAMBERS, 4, BASINGHALL STREET. *Telegraphic Address*: "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address*: "GOTHIC."

W. PARKINSON & CO.

SQUARE STATION METERS.

All the Meters (which number 14) at the Beckton Station of THE GASLIGHT & COKE COMPANY have been erected by the above Firm.

COTTAGE LANE WORKS, CITY ROAD, **LONDON.** Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS, **BIRMINGHAM.** Telegraphic Address: "GAS-METERS."

10, MAWSON'S CHAMBERS, DEANTGATE, **MANCHESTER.** Telegraphic Address: "PRECISON."
[See also Advt., p. 340.

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TO CORRESPONDENTS.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 21, 1893.

The South Metropolitan Meeting.

THE meeting of the South Metropolitan Gas Company on Wednesday last was well attended; and the assembly was treated to one of Mr. George Livesey's best speeches about gas supply in general, and the affairs of the Company in particular. Indeed, this is the principal attraction for those shareholders who make the half-yearly pilgrimage to Southwark. The South Metropolitan Directors are in the habit of issuing a very full report with their statement of accounts; but somehow this does not take the place of the Chairman's address. In his case, it is simply the mouth speaking out of the "abundance of the heart." Mr. Livesey, we believe, promises himself every half year not to talk at so great length. But, fortunately for the interest of the meetings, there is always something in the recent experience of the Company for him to make clear to the proprietors and the public; and by the time this has been done, the Chairman realizes once more that he has been giving the reporters a hard task. On Wednesday, Mr. Livesey spoke first of the state of the Company's business, and showed how the undertaking is gaining on the original capital. He then went on to deal with the relations between the Company and their workmen; and he explained the circumstances in which the Directors have offered new capital to the consumers. The latter proceeding has been criticized in some quarters; and certain people would doubtless be better pleased with the Board if the stock-jobbing interest were more respected by them. It is a sufficient justification of the action of the Board in this matter that the consumers will pay more for the stock than the stock-jobbers, provided that they can obtain it in convenient lots.

The greater part of the Chairman's speech was devoted to the subject of gas purification, and the recent troubles of the Company in this regard. This portion of the speech was really an elementary lecture upon the impurities commonly found in coal gas, and their removal or reduction under statutory regulations. The Company have been fined upwards of £200 for sulphur excesses; and nobody who knows Mr. Livesey expects him to take a blow of this kind "lying down." The matter has been between the Company and the Chief Gas Examiner; and up to the infliction of the fines in question the latter officer had his innings. On Wednesday it was Mr. Livesey's turn; and it can be easily understood with what emphasis the Chairman quoted Dr. Williamson's unfulfilled promise to put the practical chemistry of gas purification into "some "very compact form." The Chairman of the South Metropolitan Gas Company is by way of falling out with what he calls the "absurd restrictions" with regard to sulphur; and when he is in this mood, it is likely to fare badly with an opponent who presents him with such a tempting opening as the Chief Gas Examiner appears to have done in this instance.

The concluding portion of Mr. Livesey's speech dealt with the proposed reduction in price, which has, naturally, been condemned by certain shareholders. It is a truly remarkable fact that there is never a lack of shareholders' support for any proposal to raise the price of gas or keep it up; and that any hint of a reduction is sure to be cavilled at by somebody. It is the same when gas undertakings are under the control of local authorities. It would appear that, while the gas industry lasts, the type of critic of the administration represented last Wednesday by Sir Richard Wyatt, with his plea for the paramount interests of the shareholders, will always remain in evidence. The decision of the South Metropolitan Board to try the effect of a penny reduction in the selling price of their gas, is a point of policy which they have settled upon their own responsibility; and if, as must be assumed, the Company can afford it, the wisdom of the step cannot be doubted by anybody endowed with the power of seeing an inch beyond his nose. Small as the relief is, it will have a considerable moral effect upon the consumers; and it will also encourage the workmen, whose interest in reductions of price is, under the profit-sharing scheme, immediate and sensible. As may be supposed, the other London Gas Companies will not like it; but this consideration is not calculated to weigh heavily in the minds of the South Metropolitan Directors.

After a decidedly interesting discussion, marked by some really good speeches from several proprietors, which considerations of space compel us to cut down to the barest skeleton of the motions and resolutions proposed and seconded, Mr. Livesey had a good opportunity for explaining what has been done in the matter of his testimonial. Mr. Livesey owed it to himself to make this statement of how he has used the testimonial fund. If the subject of this movement had been anybody else, the world would have been bidden to admire the public spirit of the man who has succeeded in doing so much good with so little money, and has sunk his own personal gratification

in the desire to benefit those who will never know him as their benefactor. The way in which all the good that Mr. Livesey has done and continues to do is ignored by self-appointed spokesmen for the working classes of London, while every excuse for libelling and maligning him is made the most of—as in the instance of the newspaper announcement of "Livesey Fined for Bad Gas"—would be lamentable if it were not so very ordinary and popular a manner of rewarding a true public benefactor. It only means that Mr. Livesey does not act in these matters according to the spirit of the times. Any advertising contractor would, for a small percentage on the outlay, put this sort of thing right with the public.

The Meeting of the Midland Association.

THE members of the Midland Association of Gas Managers had a pleasant meeting on Thursday last, under the presidency of Mr. B. W. Smith, of Smethwick, whose valuable Inaugural Address will be found in another column. The best of this composition relates to the author's own work at Smethwick, where he has done really great things for his Local Board, having regard to the circumstances of the undertaking, and the difficulties that sometimes lie in the way of any practical gas maker who has to follow in the footsteps of an eminent Consulting Engineer. As a pyrologist and carbonizer, Mr. Smith has already achieved a reputation in the district, which will be enhanced by the admirable showing he was able to make to his visitors on Thursday. Besides inspecting the Smethwick Gas-Works, the Midland managers were shown over Messrs. Tangye's establishment, where a great deal is being done in gas-engines, as well as in miscellaneous gas-works apparatus. Altogether, the day was a very full one; and the completeness of the arrangements reflects much credit on the Committee and the Honorary Secretary (Mr. C. Meiklejohn, of Rugby). The Midland Association, as we have observed upon former occasions, are fortunate in being able to find meeting-places full of interest without going far afield; but no little art is needed for ringing acceptable changes on the pleasantest elements. That the Committee possess this art in a high degree, is shown by the maintenance of the numerical strength of the meetings.

A Decimal Coinage and the Gas Industry.

THE partisans of the decimal system of weights and measures and currency had an interview with the Chancellor of the Exchequer the other day, for the purpose of pressing upon the Government once more the old question of the desirability of substituting a system of this kind for the irrational standards in use throughout the United Kingdom. They did not gain much by their pains; for it was easy for Sir W. Harcourt to show that the expected convenience of such an alteration would be dearly bought by a fearful preliminary confusion in all the commercial relations of the kingdom. The partisans of the decimal or metrical system are a numerous and respectable body, and they have a good deal of justification for their faith in the advantages of the change they desire; for everybody who has had practical experience of the metrical currency in the countries where it holds good, must admire its simplicity. The fact is, however, that the question of the desirability of a decimal system of currency is altogether distinct from that of the acceptability of the metrical system of weights and measures; and both strike the English people differently from any other nations. After all is said and done, the English pound avoirdupois and standard foot are far more convenient units than the kilogramme or the metre; and the quart is at least as handy as the litre. Speaking for the gas industry, we are free to admit, as we have frequently done before, that the common unit of 1000 cubic feet is full large; but this is not the fault of the standard foot. The standard of the cubic metre, so generally employed upon the Continent of Europe, is, on the other hand, too small. We cannot see what advantage could be gained by the adoption of the metrical system of weights and measures in the United Kingdom, to counterbalance the cost and trouble of making the change. The system suits the chemists, who have taken to it easily; but it has not made any headway among the multifarious trades and industries in which men work by the two-foot rule. With regard to the currency, the difficulty of making a change appears to be insuperable. It would be necessary to sacrifice the sovereign in order to obtain the metrical system of the Latin countries; and this is not to be thought of. On the other hand, if the sovereign is to be retained, and the smaller coins decimalized with reference to it, the penny must be altered in value; and the penny, as the Chancellor of the Exchequer pointed out, is the standard coin of popular trading transactions. The penny measures the value of many things recited by the Chancellor of the Exchequer; and to these we may add the price of gas and of electricity. If the penny were to be altered in value in relation to the sovereign, all the sliding-scale gas legislation of the past eighteen years would be thrown out of gear. It was stated by the Chancellor of the Exchequer that wherever sweeping changes have been made in the currency of a country during modern times, it has been a consequence of a great war or revolution that has cast all the affairs of the nation into the furnace, as it were, and remoulded them. It should also be stated that wherever the metrical system of currency has been introduced, the change has been more apparent than real, so far as the popular trading of the people has been concerned. Thus in France the people were in the habit of reckoning small transactions by the *sou*, which became the piece of 5 centimes without losing its colloquial name or value. It was the same in Italy, where marketing is still done by *soldi*, though no such unit is recognized by the law. It will thus be seen that the difficulty of introducing the metrical system upon the Continent was as nothing in comparison with the proposal to decimalize the British pound sterling.

Borrowed Thunders.

IT would never be a discredit to the numerous people who borrow matter from the columns of the JOURNAL to acknowledge the source from which they take their free loans; and, on the other hand, due acknowledgment would at times absolve the borrowers from some responsibility. This reflection occurs to us with respect to a criticism that has appeared in our estimable contemporary, the *Electrical Review*, of a remark upon the electric lighting of railway trains, credited to the reader of a paper before the Owens College Engineering Society. The statement bore upon the possible risk of train lighting by the agency of storeage batteries, and showed that it would only be necessary for passengers otherwise injured as the result of a railway accident to be "blinded and scarred by the spilt acid of "the batteries" to raise popular clamour against any such method of lighting trains. Our contemporary proceeds to "slate" the author of the paper containing this remark for his "peculiar impartiality." He would have saved himself this censure by acknowledging the fact that the whole passage was taken from an article published in these columns on the 8th of November last. We appreciate the flattery conveyed in this act of appropriation, and have not the slightest grievance against the borrower. Our contemporary, however, must be annoyed at the discovery that it has wasted a piece of satire; for it would know better than to complain of any expression of opinion on our part, relating to a question of lighting, on the score of impartiality. That is a quality to which we never pretend. We hold the belief that gas lighting is good, whether for railway trains or any other application; and we say so on every possible opportunity, with all the reasons that can be brought to bear upon the subject. At the same time, it may be as well to observe that we manufacture only opinions, not facts, although we certainly exercise the right of selection in regard to the latter. Our position is so well understood that it is the height of rashness for any writer or speaker to quote our editorial remarks without acknowledgment, even when not seriously meaning to pass them off as his own.

Railway Rates.

THE new railway rates for goods traffic have been much discussed during the past week; and, with a "brutal "candour" rare with British Ministers, however familiar to observers of Prussian administrative methods, the President of the Board of Trade has warned the managers of the English railways that, if they do not put themselves right with their customers by Easter, they will come in for something very disagreeable at the hands of the Government. The whole business is significant of the continued existence in our midst of that distinction between what is lawful and what is expedient, which wise men of all ages have perceived, and fools have

ignored. When the new maximum scale of railway rates was projected, we did not take much notice of the fact that under it the cost of carriage of certain commodities would be nominally increased, because we understood the Railway Companies to occupy just the same position as Gas Companies under the old statutes—that is to say, while having a maximum rate of charge for their own protection, they had no intention of altering the rates actually charged. Consequently, we declined to join in the complaints that the promulgation of the new scale provoked from all orders of the industrial community; and but for the alarmist position taken up by the late Mr. J. Deakes, of Worcester, it is highly probable that the gas industry of the country would have reposed with us upon the good faith of the Railway Companies. Railway management, however, is an affair which we do not profess to understand. Having in mind the ignorance of the general public in regard to gas-works administration, which frequently blossoms out into the most absurd allegations against the honour and honesty of Gas Companies, we have recognized that it did not become us to assail Railway Companies without being surer of our ground than is usual for the common gas agitator. Consequently, when the Railway Companies said they wanted a system of intelligible maximum rates, we thought there was no harm in the demand. According to Mr. Mundella, the Board of Trade were of the same way of thinking, and were confirmed in their attitude by the assurances of the Railway Companies that they had no intention of making the remodelling of their maximum rates a pretence for raising their actual charges. What has happened, however, has to some extent justified the alarmists, and disappointed those who had faith in the Companies. Some classes of traffic are charged more under the new rates than heretofore; and the traders who are pinched by this change are raising a great storm about it. Nothing is said of the traffic which gets off more lightly under the new arrangement; but this, of course, is an illustration of human nature. At all events, the coming into operation of the new rates has created so much trouble, that several of the largest Companies have announced their intention of returning forthwith to the old terms. The threats of the Board of Trade probably apply only to those that have not arrived at this sense of their mistake.

The incident is not without its lesson for gas manufacturers. There are gas directors and committeemen who think and profess that the letter of an Act of Parliament is impregnable; and that permission by statute to charge (say) 4s. 6d. per 1000 cubic feet for gas usually sold at about 3s. means that the higher price might be imposed without raising awkward questions as to the absolute necessity for so doing. We believe this is a delusion; and we commend to those who think otherwise the example of the new maximum railway rates. If ever a charge for a necessary of industrial and social existence was settled on a rational basis, after exhaustive inquiry, this new railway rating could claim such a position. It was not arrived at in a hurry; and when the maximum had been agreed upon, it received statutory sanction. Yet a very short experience of practical injustice resulting from the operation of this legalized system of charging has sufficed to upset the whole thing. Why did not the Great Western and the Midland Railway Companies "nail their colours "to the mast," and insist upon their statutory rights at all hazards? Simply because they saw the impracticability of such a course; and they accordingly preferred to tear up their statutory guarantees rather than alienate their customers by clinging to an artificial advantage. The moral here is sufficiently obvious, though the typical shareholder who applauds every rise in the price of gas would never see it until it fell and crushed him.

The Health of Mr. J. Orwell Phillips.—The large number of our readers who have inquired after the health of Mr. J. Orwell Phillips, the Secretary and General Manager of The Gaslight and Coke Company, will be gratified to learn that he is making good progress, and hopes in about a week to be strong enough to leave town for the seaside. It appears that Mr. Phillips has been suffering from a severe attack of influenza, to which long-continued overwork rendered him easily susceptible. He has been warned against going away too soon, as patients recovering from this malady are very liable to relapse. As the opinion of Mr. Phillips's medical advisers is that a period of perfect rest would re-establish his health, the Directors have granted him leave of absence for a few months.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 329.)

THE general position of affairs on the Stock Exchange last week was much the same as it has been for some time. Investment buying had almost the monopoly of attention, to the exclusion of the more speculative operations; and it went on briskly at first. Later on, however, as the demand for money increased, the process received a check; and some little selling to realize profits had the effect of bringing prices down below the best of the week. In the Money Market, better rates were obtainable; and the position is much improved. Business in the Gas Market did not show much increase of vitality; and the volume of transactions did not come up to the average, except in the debenture and preference issues. Everything, however, continued extremely firm; and several considerable advances in quotation have been effected. Foremost in the advance are the Metropolitan Companies. In Gaslights, the "A" was moderately dealt in at very steady figures all the week—never falling below 223, or rising above 224½. All the debenture, secured, and limited issues were in great demand; and most of them have risen appreciably in value. All the 10 per cents., "C," "D," "E," and "J," are now quoted at one price. Why can they not be quoted in one line? For years past the "C," "D," and "E" have been quoted at one price as if they were one issue, although between "C" and "E" there are intermediate preferences to the value of about £413,000. Between "D" and "J" nothing intervenes but the small "F" and "G" issues—together aggregating only the insignificant total of £90,000. Therefore, if "C" and "E" are close enough to be quoted together, *a fortiori* are "E" and "J." The Official List is becoming very lengthy; let us point out where one line may be economized. We commend this suggestion to the consideration of the Committee of the Stock Exchange. South Metropolitans are still the warm favourites; and quotations are mounting up by bigger strides than ever. But why, with a prospective reduction in the price of gas, and its contingent corollary, a rise in dividend, the "A" stock (which has most to gain by the financial outlook) should stand at a price nearly ½ per cent. per annum worse than the "B," is one of those puzzles which we do not pretend to understand. Commercials are quiet and unchanged. The only feature in the Suburban and Provincial list is a rise of ½ in Alliance and Dublin new—a rise which has been a long time coming. The Continentals are very strong at the old figures. None of the rest present anything to remark upon; and only one or two changes in quotation are to be noted. The Water Companies are still pushing their way forward; and the feature of the moment is that the precedence in value has been wrested from New River by East London. But regard must be paid to their respective *ex div.* rates.

The daily operations were: The market opened very strong on Monday, but was not particularly active. The only change was a rise of 3 in South Metropolitan "B." New River was in demand, at an advance of 2. Tuesday was, if anything, quieter; and quotations remained unchanged. Advances in value progressed on Wednesday with a rise of 3 in Gaslight "J;" and 1 in ditto "K." Water was higher generally.—West Middlesex rising 3; Chelsea, 2; and East London, 1. Thursday's business continued below the average; but values steadily mounted. In South Metropolitans, "A" and "B" rose 2 each; and "C," 5. East London Water gained 1. Friday was the counterpart of the preceding day. Gaslight "H" rose 2; ditto, 4 per cent. debenture, 1; and 4½ per cent. debenture, 2. Malta went up ¼. In Water, East London and Lambeth advanced 1 each. Saturday was steady, with few changes. Alliance and Dublin new improved ½; but Monte Video receded to a similar extent.

ELECTRIC LIGHTING MEMORANDA.

The Cost of Lighting the Bradford Town Hall—Electrical Supply at Newcastle-upon-Tyne—Systems of Charging for Electricity—Mr. Angelo Fahie on House Lighting by Electricity.

A GOOD example of the difficulty of settling questions of the cost of electric lighting is supplied by the experience of the Bradford Corporation in regard to the lighting of the Town Hall, and in particular of the clock. It has been impossible to ascertain from the Gas and Electricity Supply Committee how much this clock lighting really costs the town. When the municipal buildings were lighted by gas, the bill amounted to between £400 and £500 per annum. But a half-year's electric lighting has cost £860; and it is not to be wondered at that the ratepayers are beginning to grumble at this piece of Corporation extravagance. At a recent meeting of the Town Council, one alderman or councillor after another rose to question the representatives of the Committee on the matter; and, after a great deal of trouble, Alderman John Hill was forced to admit that the expenditure referred to was "four or five times as much as it ought to be," and a promise was given that it should be inquired into. The Alderman further "agreed that the present cost of lighting the clock tower was "enormous." This is a bit of Bradford experience that should not be overlooked when the electric lighting venture of the Corporation is cited, as is frequently done, for the purpose of inducing other local authorities to embark in similar undertakings. It is all very well for

Mr. W. H. Preece, and other plausible gentlemen in the same line of business, to talk glibly of the cost of generating electricity at Bradford; but let us not forget that the Corporation have to bolster up their venture by paying after the rate of £1700 a year for lighting the Town Hall alone. This is the order of facts relating to electric lighting which is only to be found in due prominence in these columns.

The speech of the Chairman of the Newcastle and District Electric Lighting Company at the recent ordinary general meeting of the Company is instructive reading. The Company appear to be doing very fairly well; and the dividend after the rate of 5½ per cent. per annum recommended by the Board seems to have been earned, although the question of repairs and maintenance is rather lightly treated. After all, the undertaking is a small affair as yet; the gross revenue for the past year being only £2139. The business is progressing, however; the output having risen from 206,017 units in 1891 to 290,469 units last year. At present the cost of producing the unit is rather more than 3d., taking the average for the year. It costs 4½d. in the summer, and 2d. in the winter months. The Chairman, unlike some other gentlemen similarly situated, is honourably plain and truthful in his statements respecting the cost and the prospects of electric lighting. He hopes for the day when his Company will be able to produce electricity at a net cost of 1d. or 1½d. per unit; but he admits that a lighting business alone will not bring this about. He accordingly desires to establish a connection for motive power, ventilation, &c. "Sixpence per unit electricity," says this extraordinarily candid authority, "is equal to about 5s. per 1000 cubic feet of gas." He went on to remark that "the gas companies have not much to fear in the way of competition, so long as the price of electric lighting stands at 5d. to 6d. What we want to be at is to be able, profitably, to supply electricity for lighting purposes at 3d. per unit, equal to only 2s. 6d. per 1000 cubic feet of gas." Just so. If this could be done, the electric lighting companies would stand on a much better footing than they at present occupy anywhere.

The gravity of the question of price is appreciated only too well by central station electric lighting companies; and even the St. James's and Pall Mall Company, who have at their command the wealthiest corner of the richest city in the world have lowered their charges from 7d. to 6d. per unit, with special discounts bringing it down to 5d. in some instances. It remains to be seen whether Clubland will be appeased by this concession, and weaned from that newly-found habit of economy with which the Chairman of the Company reproached his patrons at the recent general meeting. The Brighton Corporation, acting under the advice of Mr. A. Wright, have adopted the expedient of charging half price for all consumption in excess of two hours per day per 8-candle lamp connected. This means, of course, an additional complication in registration. A recording instrument is placed by the Corporation on the consumer's premises. The readings of this instrument are to be averaged in the three darkest months of each half year, and this average will be taken as indicating the number of 8-candle power lamps demanded, also the number of units to be consumed in each half year before half price begins to be charged. This account is given by our contemporary the *Electrician*; and we cannot say we fully understand the procedure. But let us hope the Brighton people will both understand and appreciate it. While mentioning Brighton, it may be remarked that there should be an instructive and interesting fight in the Committee-room over the local Electric Lighting Bill. The local Hammond Company are opposing the Corporation by the aggressive method; and there will in all probability be some startling exposures on both sides.

As already mentioned, we have received a copy of a little book upon "House Lighting by Electricity," the work of Mr. Angelo Fahie, who has been connected with the popularization of electric lighting in Ireland. The character of Mr. Fahie's advocacy of electricity may be ascertained from the concluding sentence of his preface, which says: "Only those who have already made use of the electric light in their homes can properly appreciate its real value." If the last word were to be printed "cost," the sentence would be equally true, and much more instructive. The book itself is neither better nor worse than many other similar productions of the kind which have come under notice. In stating the comparison between electric light and gas, Mr. Fahie is more reasonable than many of his fellow-electricians, since he admits that the equivalent cost of gas is to be found by multiplying the price of the electrical unit by ten. On the whole, the inhabitants of Dublin, for whose edification this little manual was in the first place compiled, may safely trust the author in regard to many things upon which intending users of electric light naturally require some guidance. He says nothing about isolated plants—his remarks being based on central station work; and it will not be his fault if the Dublin Corporation speculation does not recommend itself to the leading tradespeople and householders of the Irish capital. The Dublin charge for electricity is at present 8d. per unit to start with, falling to 7d. after the first 100 units. This is decidedly dear; and the sooner the Corporation come down to the level 6d., the better it will be for their prospects. We do not say that they can afford to supply electricity at the lower figure; but they will not lose more money at it in the long run than at 7d. or 8d. per unit.

WHERE DO WAGES COME FROM?

In commenting a fortnight ago on Sir Thomas Farrer's views respecting labour and wages, we made passing reference to some observations of the Duke of Argyll upon the same subjects, contained in his recently-published work, "The Unseen Foundations of Society." Having regard to the importance of the subject, it will be better to expand this reference by stating the nature of the contribution made by the Duke to the elucidation of one of the most difficult, as it is one of the most pressing, of the problems of the day. Employers of labour are face to face with an organized revolt against all the traditional theories concerning work and wages. They may profess the utmost scorn and contempt of the mouthpieces and ringleaders of this organization; and they may heartily wish for a return of the times when there were no Fabians, or Marxians, or Social Democrats to fill workmen's heads with the notion that employment is not a privilege but a right, and that the receipt of wages does not carry with it any sort of obligation to be grateful. All the same, however, these people exist and must be reckoned with, for good or for evil. The past never returns. Employers of labour in the present day are an impeached class, according to the notions of the Fabians and their allies. It is idle for them to assert that the Fabians talk nonsense; for, in these days, if it is not yet quite true that one man is as good as another, it is certainly true that one man's word carries as far as that of another, and the wealthiest employer must rely upon something else than his own assertion if he desires to carry more weight in argument than the stump-orator at his gates.

It is because we believe that employers of labour in general, including managers of gas-works, occupy a position in the industrial community which is logically defensible as against the crude reasonings of Fabians, and because we are further convinced that such employers desire to feel that they are justified in maintaining this position, that we devote the space of the Journal to the discussion of these problems of industrial economics. It might be possible for anybody noting the course of events in regard to the labour and payment (say) of gas workers, to dismiss the whole matter with the reflection that the employers still have the power to compel their workpeople to obey their behests. The employers are still the "masters," inasmuch as they speak the last word with regard to the amount of work to be done and the wages to be earned by every man in their employment. They are able to do this, as is universally admitted, because they still retain the call of the labour market. If one man will not accept their terms, others are ready to do so; and therefore the actual working staff is perforce resigned to the conditions of the employment. Whether this resignation is tantamount to contentment is a question which many employers refrain from asking, even of themselves. Yet the question must arise whether it is right for employers to use this power of imposing their will—their reasonable will—upon their workpeople. One can readily conceive of cases where an agent of the employers, himself a worker for wages—only under the name of salary—might ask whether, after all, he is justified in withstanding, in the name of the common employer, the demands of wage-earners for a larger share in the profitable results of their toil.

This man ought to read the Duke of Argyll. The query we have suggested is one that raises the fundamental question of the source of wages. Do wages come out of capital, or out of the work of the wage-earners themselves? The Duke says, in the name of Political Economy (and, as we believe, rightly) that wages come out of capital. Socialism, as it is understood by our latter-day agitators, says they are made by the workers themselves. The distinction is radical, and leads to the gravest consequences. If wages come out of capital, then the employer—who is capital personified and in action—has the right to pay what rates of wages he pleases, or can get men to accept, having regard to the terms offered by other capital differently employed. On the other hand, if all wages come out of labour, it is difficult to see why the labourer should not have the first charge upon the product of his toil—*i.e.*, why he should not take it all. The Duke of Argyll renders it plain, however, that wages are paid by "capital"—meaning money, or money's worth, which somebody other than the wage-earner has previously saved from income, has stored for the purposes of increased production, and is actually so employed. An illustration is given, which, with hardly any alteration, can be applied directly to the case of a gas-works. "A man has saved out of wages, or out of some other source of income, let us say, a thousand pounds. On this capital he starts, on a small scale, in some trade or manufacture [suppose he builds a gas-works, alone or in association with others]; and the outlay which he can afford to spend on wages must come at first out of this fund. That is to say, until profits begin to come in, he must use his thousand pounds for paying the wages of any men whom he may need to hire. And it must be remembered that there are many conspicuous cases in which no profits or returns whatever can ever even begin to come in until the whole work of manual labour has been completed." How true this is of gas-works, the rating surveyor, with his allowances for enabling the "hypothetical tenant" to carry on business until he gets his rental in, is a sufficient witness to prove.

Wages, therefore, are here provided out of capital; but, it is

pointed out, "the wages are only so paid because of the anticipation of returns confidently expected when the work is done. It is, therefore, a mere advance. It represents a value actually received; and that value entirely depends upon, and essentially consists in, that sense of security without which no confident anticipations can arise in anything. It is out of these that the wages are really paid; and if they are not fulfilled, the wages will cease to be paid at all." This consideration, being unseen, is commonly ignored by the workman and those who speak for him in the Fabian tongue. The wage-earner sees what he does; he sees the profit-bearing undertaking growing under his hand; he carbonizes the coal and makes the gas which is sold at a profit. "His knowledge is founded on the direct evidence of his senses. . . It is in vain to tell him, because it is not just or true to tell him, that his wages are not paid for by his own work. . . All that can be done with truth to supplement and perfect his convictions, and our own, is to remind him of a good many things which he cannot see with his bodily eyes, or touch with his bodily hands, although some corporeal symbols, and even some constant reminders of them, must have been before him all his life. *Everything that constitutes the value of his work depends absolutely on the mental calculations and expectations of his employer*, founded on the known desires of other men. These underlie the whole organization in which he does an unit's work." The italicized remark is the expression of a truth of which our Fabians have no cognizance; and yet it is the justification for the employers' position. The Duke of Argyll tells how, on one occasion, he heard a working man remark, in public meeting, that he never could see why any other man should make any profit out of his work and labour—why the whole of it should not belong to himself. This is precisely the Fabian position at the present day. In confessing his inability to resolve this question upon the instant, the Duke places himself on all fours with the ordinary member of the industrial community, who is persuaded that such language covers some fallacy, while he is unable to state precisely in what the fallacy consists. In the case of the Duke, however, reflection has brought the answer of which others may still be ignorant.

The fallacy in this case lies in the forgetfulness of numerous neglected elements—all hid under the ambiguities of language. What this man called "his own work" consisted in reality of an aggregate value due to numerous sources of contribution other than his own. "Whatever his particular handicraft may have been, it is probable that the raw materials on which he worked were not his own, and very likely not even the tools with which he worked upon them. And even if both these were his own, which would be a rare case under our present conditions of industry, it is quite certain that other contributions to the total value of his production, far more important than these, came from the capital and the brains of other men. The factory or premises in which he worked had been built or hired by others. The site or situation on which that building was erected —often a most determining element in the value of products—had been provided by others. Salaries of men whose labour was higher than his own—the hire of fellow-workmen without whose co-operation his individual work would have been fragmentary and ineffective—had all been, and continued to be, provided by others. Above all, the original conception by which the whole business or manufactory was begun, set going, and established; the risk of loss in it which had to be encountered; the thought and ingenuity and continuous skill by which the products were adjusted to a pre-existing demand, or the still higher skill and ingenuity by which perhaps a new demand was excited by the attractions of a new production—in all these this man had no more share than the engine or the water-wheel which may turn some drums or lathes." But there is more than this to go to the reckoning of what gives value to labour; and it is to be found in the laws which protect all rights, and enforce all contracts, as between man and man. This is the origin of that sense of security already mentioned upon which capital rests when a new venture is started, or an old one is carried on. "A system of settled jurisprudence, with an honest and a firm executive—the paramount reign of law in all the relations of men—these are the indispensable, though the too-often unseen and unthought-of foundations of every industrial society." Taken altogether, this is the explanation of the source of wages. Once more let the position be summed up: "The division of labour has become so great that each one man can do no more than make some bits of articles. The putting together of the bits is done by others; and behind the mere putting together of the bits lies the original designing of the completed article, so as to suit some particular kind of customer. And, again, behind the designing and the taste of it there lies always the capital invested in raw material and in workshops; and behind that capital, again, lies always the spirit of enterprise and the energies of a conceiving mind. This, once more, rests on confidence in the law of contract, in the purity and integrity of judicial courts, in the efficiency of police administration, and, last not least, in the permanence of those convictions of duty on the part of society which are the only secure basis of established law." How feeble and scrappy beside this masterly exposition of the conditions of prosperous industry appears the vapouring of a Thorne about the abstention of the police from interfering with the decision of a trade dispute by the mob method of brickbats. Depend upon it, if the foundations of industrial society were ever to be seriously assailed by the "men of the street," they would be replied to by grape-shot; and this in the interest of the poorest as well as of the wealthiest orders of the community. For when public security is threatened, who are the first sufferers, if not the resourceless poor, who are never half-a-crown ahead of the world in all their struggling lives? When the soldiery descend into the streets, the monied classes can flee into undisturbed regions of the world; but the whole brunt of the trouble falls upon the people who cannot go away. Enough, however, for the present. We have permitted the Duke of Argyll to explain to readers of the JOURNAL where wages come from. On a future occasion we may follow him into other industrial disquisitions.

Mr. J. M'Nair, Gas Manager to the Wishaw Corporation, has been granted an increase of £10 a year in his salary, together with an honorarium of £50, for his services in connection with the extension of the gas-works.

The New Railway Rates.—The Town Clerks of five of the principal Corporations in the country owning gas-works (Bradford, Birmingham, Leicester, Manchester, and Nottingham) have taken steps for the holding of a conference of corporation representatives on the question of the new railway rates, at the Westminster Palace Hotel next Thursday.

The Metropolitan Water Supply Inquiry.—The Commissioners appointed to inquire into the Metropolitan Water Supply resumed their sittings, under the presidency of Lord Balfour of Burleigh, on Monday last week, and continued them till Wednesday, when, as far as could be ascertained, the evidence was concluded. We regret that, owing to the pressure on our space, we are compelled to hold over till next week the continuation of our report of the proceedings.

Novelty in Patents.—Some correspondence has passed between Mr. Leng, M.P., and Mr. Mundella, President of the Board of Trade, in which the former points out that in this country, when an inventor applies for a patent, although there may be a score of patents already covering what he proposes, the Patent Office gives him no information or warning that such is the case. In the United States, Germany, and other European countries, on the other hand, an official examination as to novelty takes place; and Mr. Leng suggests that Great Britain should not lag behind foreign countries and its own colonies in a matter in which the interests of inventors, scientists, and manufacturers are so much concerned, and that an instruction from the Board of Trade to the Patent Office would effect what is required. Mr. Mundella, in reply, states that Mr. Leng's proposal, if adopted, would involve a radical change in the principle and policy of the patent laws. The suggestion is to receive careful consideration; but there is little prospect of any legislation of this nature being undertaken during the present session.

Important Proceedings against the South Metropolitan Gas Company.—An important action against the South Metropolitan Gas Company commenced in the High Court of Justice last Friday, before Lord Justice A. L. Smith, without a jury. The plaintiff, a Mrs. Chapman, is the owner of a large number of houses in Bermondsey, in the vicinity of the Company's works; and her case is that since the Company commenced manufacturing sulphate of ammonia, there has been a constant and increasing damage to the paint of the houses, which is attributed to the fumes of sulphuretted hydrogen. She asks for damages, and for some order which, without stopping the works, shall necessitate such precautions as will prevent damage in future. The defendants' case had not been opened when the Court rose yesterday; but, from the cross-examination, so far as it has gone, it appears to be a denial that the effects complained of are attributable to the working of the sulphate plant. Sir Henry James, Q.C., M.P., Mr. Oswald, and Mr. Pochin are Counsel for the plaintiff; Sir R. E. Webster, Q.C., M.P., Mr. Jelf, Q.C., and Mr. Swinfen Eady represent the defendants. A full report of the case will appear next week.

Society of Arts.—At the meeting of this Society last Wednesday, Professor Clowes, of University College, Nottingham, read a paper on "The Detection and Estimation of Small Proportions of Inflammable Gas or Vapour in the Air." In the course thereof he described a new testing apparatus, consisting of an ordinary miner's safety-lamp burning an oil-flame in the usual way, but provided, when necessary, with a small light-attachment, consisting of a steel cylinder filled with compressed hydrogen gas. When a cylinder is attached to the safety-lamp, it furnishes a supply of hydrogen gas to a jet issuing near the lamp-flame. The gas is kindled by the flame; and upon the extinction of the oil-flame by the usual device from outside, a hydrogen testing-flame is obtained, burning securely in the interior of the lamp. When the lighting-flame is required, the wick is kindled by pushing it up from outside against the testing-flame; and as soon as the former is burning, the latter is extinguished. In the discussion which followed, Sir F. Abel (who presided) said the invention was of no little importance. There were many devices for detecting small quantities of fire-damp; but he thought they had all been surpassed in simplicity and certainty by the result of Professor Clowes's patient investigations of the subject.

NOTES.

Durable Mortar.

A correspondent of the *Builder*, who has already written at length upon the subject of ancient and modern mortar, has lately sent to the same journal some further analyses of mortars taken from old abbeys and castles, for comparison with the mixture favoured by modern builders. The article is illustrated by photo-micrographs of the mortars referred to. The analyses show great variation in the proportion of lime in the different mortars; the sample from Crowland Abbey, Lincolnshire, containing the most (41·50 per cent.), and that from Fountains Abbey the lowest (15·79 per cent.). The average of seven ancient specimens taken was 25·95 per cent. The writer declares the Fountains Abbey and Whitby Abbey mortars to be the best; the former having outlasted the stone. Great importance is attached to the proportion of gelatinous silica in a mortar, as this ingredient determines its induration as well as its tenacity. This is the active constituent in Portland cement; and just in proportion as limestones furnish a lime rich in it, so are they valuable for making mortar that sets quickly and ultimately becomes specially hard. Thus Dorking grey lime, when freshly burnt, contains 9 per cent. of gelatinous silica; while good Aberthaw blue lias lime is still richer, for it contains as much as 15 per cent.—thus closely approaching in this respect the best Portland cement, in which the proportion of gelatinous or hydrated silica rises to 20 or 21 per cent. Indeed, when good Aberthaw lime can be had upon easy terms for carriage, it is probably more economical than Portland cement. In none of the old mortars does the proportion of sand to lime rise above 2 to 1. Finally, the writer concludes from his researches that a high percentage of lime in old mortar is not necessarily indicative of superior quality; but that in no case did the old builders gauge their mortar poorer than 2 to 1, which is a much higher proportion than is commonly observed in modern mortar. Also, that the proportion of gelatinous or hydrated silica is a reliable indication of the durability and tenacity of a mortar; and that the higher the percentage of this constituent, the more closely will such mortar approach the character of a cement.

Permanent White Paint for Gasholders.

Professor W. N. Hartley, F.R.S., has lately read a paper before the Society of Arts upon the chemical technology of drying oils, oil-boiling, and bleaching, in the course of which he introduced some interesting particulars respecting the process for the preparation or drying oils of a pale colour devised by himself and Mr. W. E. B. Blenkinsop. The object of the process is the production of drying oil absolutely free from lead and from colour, as compared with ordinary oils; and this is claimed to be attained. The process consists in, first, refining the oil by the removal therefrom of water and mucilage; and, secondly, boiling and bleaching it at one operation. The bleaching agent employed is manganese linoleate, dissolved in hydrocarbon, and added to the oil in sufficient quantity. The colouring matter of the oil forms a compound with the manganese, which while it remains in solution is very speedily oxidized in contact with air, especially when a current of air or oxygen is blown through. Excellent drying oils have been produced by this process, which have been successfully used as a coating for ironwork with or without the addition of a pigment. The advantages of a pale boiled oil free from lead are that zinc white retains with it its pure white colour and delicate tints, and colours containing sulphides do not darken with time. Special mention was made by Professor Hartley of the case of gasholders, which he said may be painted an unalterable white with such oil and zinc white. For complete success, however, the zinc white must itself be free from lead carbonate or oxide. Professor Hartley exhibited panels painted with zinc white and the new process oil, which were not only exceptionally pure in colour, but were quite unaffected by an atmosphere containing sulphuretted hydrogen.

Luminous Images in the Eye.

How many images of an object, such as a lighted candle, are formed in the human eye? The question is not without interest to photometrists as well as to opticians and physiologists. According to a correspondent of *Nature*, in addition to the refracted image, which serves the purposes of vision, there are formed in the eye three reflected images known under the name of "Purkinje's images," from the observer who first saw them at the beginning of the century. They can be easily observed by two persons on holding a lighted match between their eyes, and moving it about so as to make the reflections seem to come from the pupil. They are reflections from the surfaces of the different constituents, or so-called lenses, of the eye, through which the rays of light have to pass on their way to the retina. In addition to these Purkinje images, a French observer, M. Tcherning, has recently detected and described three more; thus bringing up to seven the total number of images formed in the human eye of any object. It might be thought that so many reflections must mean a loss of light; and this is so. But a comparison of the eye with a simple lens tells greatly in favour of the efficiency of the former. In the eye, the percentage of useful light is 97; in a simple lens, 92; and correspondingly less in any compound optical instrument. But the light reflected from any of the internal surfaces is also liable to be reflected back into the eye or the optical instrument, with the effect of superimposing a more or less faint patch of light upon the image on the retina. M. Tcherning calls this the "noxious light;" and it amounts in the case of a lens to ½ per cent., while in the eye it is as low as 0·002 per cent. "The easiest way of observing it," says M. Tcherning, "is to look straight forwards in a dark room, holding a lighted candle in the hand about 20 centimetres from the direct line of vision. On moving the candle gently from side to side, a pale image of the flame is seen on the opposite side of the line of vision, distinct enough to show it is inverted; it moves symmetrically to the candle with respect to the line of vision. The rays which form this image have undergone, besides several refractions, two reflections—one at the posterior surface of the crystalline, and another at the front surface of the cornea."

The Management of the Rhyl Gas-Works.—The Rhyl Improvement Commissioners have appointed Mr. Leonard G. Hall as Manager of their gas-works. Mr. Hall was a pupil of Mr. J. Hepworth, of Carlisle, and was his assistant until he received the appointment at Rhyl.

The Liberty and Property Defence League.—We have received a copy of the annual report of the Council of the above League, the object of which is to maintain freedom of contract, uphold proprietary rights, and resist socialistic legislation. They state therein that the work and usefulness of the League during the past year—the tenth of its existence—have again shown an increase; and that the signs of the times unfortunately seem to indicate that, in its second decade, there will be more need than ever for its existence. After referring to the establishment, by the London County Council, of Municipal Socialism as one of the political terrors of the immediate future, the report states that, among the many openings for municipal action of which local bodies, in their mania for trying their hands at everything, are taking advantage, is that offered by trade. Gas and water undertakings are cited as instances of this; and it is pointed out that, in several cases, loss is incurred in connection with the latter. With regard to gas, the Council call attention to the fact that, according to the Board of Trade returns for 1891, there were produced, on an average, 238 cubic feet of gas less by local authorities than in the case of private companies. The Council are of opinion that, where private enterprise is found ready and able, under certain restrictions, to meet public wants, there municipal management should be opposed. They have for some time past had under consideration the desirability of summoning a conference of representatives from the various private gas, water, and other companies, in order to take steps for common action in self-defence. An account is given of the public meetings held during last year, as well as of the action taken, in connection with other Societies, in opposition to measures introduced last session; and the report closes with lists of the Council (the Chairman of which is the Earl of Wemyss) and officers, and the publications and branches of the League, the central offices of which are at Westminster Chambers, S.W.

Holman's Improved Sewer-Gas Destructor.—Our readers may remember that, about six months ago, the Brentford and Richmond Gas Companies gave notice to the Local Authorities of those towns of their intention to discontinue the supply of gas to the Holman sewer-gas destructors, owing to a fear entertained that, in the event of any extraordinary leakage of coal gas into the sewer, an explosion might be caused by the gas coming in contact with the exposed flame of the destructor. Mr. Holman immediately applied himself to the task of overcoming the difficulty thus raised; and he eventually produced a new safety furnace in which he dispenses with the wire gauze formerly employed as the separating medium. It was the liability of this gauze to deterioration which constituted the element of danger in the appliance; and, as now constructed, this has been removed. The new furnace was publicly tested at the Richmond (Surrey) Gas-Works last month, and was found to act satisfactorily. It consists of a series of cylindrical rings or segments of great strength, each mechanically fitted to pass universally. An intermediate ring divides the combustion chamber from the vertical air passages formed between the inner and outer rings of the furnace. The heat is conveyed to the outer ring by means of thick cast-iron webs, which form tiers of air channels through which the uprising sewer air passes. The burner is supplied with air taken from the outside of the destructor column; and the quantity required to consume the gas used for heating the furnace will not, it is stated, reach 100 cubic feet per hour. It is claimed that one destructor consuming 8 feet of gas per hour will exhaust 79,000 cubic feet of sewer air in 24 hours, at a cost of 6½d. per day, or £9 18s. 4d. per annum; and that twenty destructors, each exhausting 79,000 cubic feet, will give an aggregate discharge of 1,580,000 cubic feet per day, taken from the sewers of a town or district, totally independent of atmospheric conditions. Deducting 10 per cent. for expansion leaves 1,422,000 cubic feet, which is equal to the contents of 370 miles of 12-inch sewer-pipe exhausted per diem, at an aggregate cost of £198 6s. 8d. a year. The Sewer Ventilation Sub-Committee of the Richmond Corporation have reported to the Highway Committee (consisting of the entire Council) their satisfaction with the furnace; and the latter Committee have decided, subject to the Gas Company agreeing to continue the supply of gas, to adopt it.

COMMUNICATED ARTICLE.

COAL GAS: ITS MANUFACTURE, DISTRIBUTION, AND CONSUMPTION.

A Series of Articles for Gas Students.

(*Continued from p.* 268.)

STATION METERS.

On leaving the purifiers, the gas next encounters the station meter, the special function of which is to register the quantity of gas as made, and thus keep a check principally upon the retort-house work, and also upon the general working conditions all round, and, indirectly, upon the distributing plant of the undertaking—the mains, services, &c. This latter result is effected by the periodical comparison of the quantity of gas made, as indicated by the station meter, with the amount *sold*, as registered by the consumers' meters, and usually calculated for as regards gas used in public lighting, on the works, and by other sources of consumption which may not be metered.

As every student is aware, gas-meters are of two kinds—dry and wet. The station meter is invariably of the latter class. It may be said to consist primarily of three parts—the outer case, of cast iron, which is suitably mounted on firm and level foundations, and which, in small works of a maximum make of, say, 400,000 cubic feet per diem may be cylindrical in form (the larger sizes being rectangular, and surmounted with a roof of sheet iron*); the measuring cylinder or drum, made of charcoal-annealed tin, which revolves on suitable bearings fixed in the outer case; and the indicating mechanism, connected to the drum-spindle, and actuated by the revolutions of the latter to correctly register the quantity of gas passed through it.

The form of the station meter is well known; and it usually provides one of the chief ornaments of the works. In principle it is similar to the smaller consumer's wet meter, but is somewhat simpler in construction. The drum of a wet gas-meter, beautiful in the simplicity of its design and construction, is nevertheless such as to render it practically incapable of such lucid verbal description as may unaided convey to the student a clear perception of its form and the principles of its action. He is therefore strongly recommended to personally examine either a model drum or such as may readily be obtained from some disused meter. More attention will be given to the subject when dealing with consumers' meters; and the following remarks are intended merely to apply to the station meter. If the student will follow the description given with a model before him, as suggested, he can hardly fail to readily grasp, once for all, what to many has proved a somewhat formidable matter. He will with advantage cut away a portion of the hollow cover, and also sufficient of the side of the chamber thus exposed to view as may enable him to examine the interior.

In the centre of the drum is fixed a spindle, which works in bearings suitably fixed in the outer case, and upon which the drum is rotated by the pressure of the gas. The two sides of the drum are open around the centre, in order to provide free water-way between the back and the front of the meter. Radiating towards the periphery of the drum, from positions equidistant from the centre, are four diaphragms, which divide it into as many compartments or segments. These radial diaphragms are placed obliquely with the axis of the drum, and thus meet with little or no resistance from the water as in the course of their revolutions they enter and pass through it. The inlet and outlet passages are provided by slits formed in the front and back of the drum respectively. These are not precisely coincident with the edges of the diaphragms; the sides of the drum being so formed as to cause the slits or passages to radiate at an angle of about 45° with the side edges of the diaphragms. The passages in the front are thus somewhat in advance of the compartment to which they form the inlet; the outlet passages being correspondingly behind. Over the *inlet* side of the drum is fixed a hollow cover, which provides the inlet chamber to the drum, and which, like the rest of the latter, and for the same reason, is cut away around the centre. Gas enters this chamber by means of a pipe, which, connected with the meter inlet, passes through the centre orifice, and turns upwards some little distance above the water-level. The pipe is termed the "spout." The water-level is fixed at a point arrived at by experiment. This is, of course, such as to effectually seal all the various openings except the inlet and outlet passages of the several chambers.

Now let the student take up the model with the inlet side (that with the hollow cover) towards him, and imagine the water-line at such a level as he conceives will meet the requirements just named. Turn the model very slowly round from *right to left—i.e.*, ascending on the right side, descending on the left. This represents the revolutions as effected in practice by the pressure of the gas. Now, bearing in mind that such of the inlet chamber (embraced inside the hollow cover), as is above the water-level, is supposed to be full of gas, note the first inlet passage to the interior of the drum as it emerges above the level. Through this slit the gas immediately enters the chamber, which, by its own inherent pressure, it forces upwards out of the water, and ultimately fills with gas. Now note the position of the *outlet* passage of this same chamber on the opposite side of the drum. (This will not be the next following upon the inlet passage, but the next but one.) It is still immersed in the water. The continued revolution of the drum now brings down the inlet passage again to the water-level. The outlet passage on the opposite side is, however, rising to the same level, and becomes unsealed. As the water enters on the inlet side, so the gas is expelled on the outlet side, until the whole chamber is again immersed. The gas as expelled passes direct to the meter outlet. In the meantime, the next chamber following has risen, been filled with gas, and is now being in like manner discharged; and it is, of course, being succeeded by the one behind, which in its turn is followed by the fourth chamber, which precedes the one first noticed, and completes the revolution of the drum. The cubical space in each chamber when out of the water and full of gas is known. Four times this space represents the available capacity of the drum, and consequently the quantity of gas that has been contained by it in each revolution. The spindle of the drum is connected with a train of wheels and the meter dials, and thus the number of revolutions effected is recorded, and consequently the amount of gas passed through is correctly registered.

The accuracy of registration of a meter depends largely upon the constant maintenance of the water-line at the right level. If the line be high, the space in the chamber left for the gas will be correspondingly reduced, and the meter will register a quantity of gas in excess of that actually passed through. In this case the meter is said to register "fast." If the water-line be low, the cubical area occupied by the gas in the chamber will be correspondingly increased, and the meter will register "slow"—*i.e.*, it will indicate a smaller quantity of gas than that which has actually passed through. The proper maintenance of the water-line in the station meter is best secured by placing the outlet of the water-overflow pipe at the proper water-level. A small quantity of clean water should always be kept running into the meter. By this means the level is not only kept constant, but the water is being continuously and gradually changed; thus obviating such troubles of contamination to the gas and injury to the meter drum and fittings as would be incidental to the presence of the various impurities that might, in time, be absorbed by the water.

The capacity of the station meter is given in "King's Treatise on Coal Gas" as the quantity of gas it is capable of passing in one hour; the wheel making 120 revolutions in that time. Thus a wheel of 10 feet capacity is considered equal to dealing with a make of 1200 cubic feet per hour, and so on.

The principal accessories to the station meter are as follows: A water-line gauge, by which the water-line can be readily observed at any time; an adjustable water-tap or valve and water-sealed pipe and funnel, for conveying inside the meter case a continuous stream of clean water, and a similarly sealed overflow discharging the surplus water into a waste-pipe also provided with a funnel; also a differential pressure-gauge, or separate gauges, fixed on the outlet and inlet pipes respectively, by which the amount of pressure absorbed by the meter may be known. This matter of pressure is important, as an undue increase will cause the meter to register "slow." Hence it is necessary to reduce as much as possible the friction incidental to the working of the drum. The spindle or shaft of the latter is therefore supported, in large meters, by anti-friction wheels. Provision is also made for readily shutting off the gas from the meter, and bye-passing it direct to the holders, in case of accident, emergency, or occasion for repairs. This may be effected either by separate valves to the inlet, outlet, and bye-pass connection, or by a combined arrangement. The hydraulic bye-pass, and the valves generally, will be dealt with in the next article. Large meters are provided with a clock and tell-tale apparatus, designed to automatically indicate, on a revolving diagram which is renewed each day, the hourly make of gas. This apparatus is well known, and only requires a moment's inspection. Hence no more than this passing reference is necessary here.

A great improvement has of late years been introduced by dividing the meter drum into three compartments instead of four. This was the invention of Mr. W. Parkinson; and meters of a capacity up to 250,000 cubic feet per hour are now constructed upon this principle. The most important of the advantages secured by the invention are greater simplicity of construction, less friction, and a considerable reduction in the amount of pressure absorded in working as compared with the ordinary four-compartment drum. Another important improvement is the adoption of the "Reliance" principle to station meters, by which the water-line inside the drum is maintained at the same level as in the outer case.

* Meters of a capacity of 250,000 cubic feet per hour are now made in cylindrical cases—chiefly for export.

Mr. F. J. M. Key, of Sheffield (late of the Ceará Gas Company), has been appointed to the position of working foreman to the Mirfield Gas Company, recently advertised in the JOURNAL.

Mr. W. Terrey, of the Sheffield Corporation Water Department, has had his salary advanced to £600 per annum from March next; he undertaking to enter a into fixed engagement with the Corporation on those terms for three years from that date. Mr. Terrey was desirous of becoming a candidate for the position of Secretary to the Birmingham Corporation Water Department; but his present employers wished to retain his services.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Sixteenth Annual Meeting of this Association was held in the Grand Hotel, Birmingham, last Thursday—Mr. B. W. SMITH, of Smethwick (the President), in the chair. About 40 members were present.

The minutes of the previous meeting were read by the HON. SECRETARY (Mr. C. Meiklejohn, of Rugby), and confirmed.

COMMITTEE'S ANNUAL REPORT.

The annual report and statement of accounts were taken as read, and adopted, on the motion of Mr. J. T. LEWIS (Wellingborough), seconded by Mr. J. S. REEVES (Bilston). The report was as follows:—

The Committee have pleasure in submitting the following report for 1892.

The annual meeting was held in the Grand Hotel, Birmingham, on Thursday, March 10, 1892. Owing to the indisposition of the President (Mr. W. Littlewood), who wired his inability to be present, the chair was taken by Mr. R. O. Paterson, of Cheltenham. As the President's address was necessarily postponed, no business other than of a routine nature was brought before the meeting. As soon as the latter was disposed of, the meeting was adjourned till 2.30 p.m., when the members were driven to the works of Messrs. Pigott and Co., Hooper Street, Spring Hill, Birmingham, for the purpose of seeing the Sutherland arrangement of water-gas plant there, and of witnessing the application of the gas for welding wrought-iron tubes, sugar-pans, &c. The members were very courteously received by Mr. Lloyd, who, with several assistants, conducted them over the works.

The spring meeting was held in Rugby, on the invitation of Mr. Peter Simpson, whose Directors kindly granted the use of the Board-room for the purpose. In the unavoidable absence of the Chairman of the Company (Mr. Parnell), Mr. Lawrence, the Vice-Chairman, together with the Secretary, Mr. Wratislaw, and Mr. Simpson, the Manager, gave the members a hearty welcome. After the disposal of the usual business, the President (Mr. Littlewood) delivered his Inaugural Address, dealing in a very practical and interesting manner with the chief topics of present-day management, the abnormal price of coal, the labour problem and profit-sharing, the standards of light, and carburetting with oil. On the conclusion of the President's Address, a paper was read by Mr. Hutchings on "The Monier Construction System," in the discussion of which several members took part. The members subsequently visited the famous Rugby Schools and Chapel; and, in conveyances provided by Mr. Simpson, enjoyed a drive of two hours through the charming country in the neighbourhood. On returning from the drive, the members were divided into two parties to visit the works of the Rugby Cement Company and the Newbold Cement Company, where the manufacture of Portland cement was shown, from the quarrying of the stone to the finished product. On the invitation of Mr. Simpson, the members then dined together in the Board-room of the Gas Company; thus bringing to a close a very enjoyable, and one of the best attended, meetings of the Association.

The autumn general meeting was held in the Grand Hotel, Birmingham, on the 27th of October, 1892—the President (Mr. Littlewood) in the chair. The discussion of Mr. Hack's paper on "Elliott's Process of Continuous Carbonizing," read at the October meeting in 1891, and which had been repeatedly postponed to enable the Committee appointed last year to report, was then taken; no opportunity having been afforded the Committee to visit the works or to examine the process at Ludlow. Considering the time that had elapsed since the paper was read, the discussion was interesting and well sustained. A practical and well-written paper by Mr. T. B. Jones, of Willenhall, on "Stopped Ascension-Pipes: Their Cause and Cure"—the latter being the insertion of a perforated drum or cylinder of Mr. Jones's invention—led to a good and animated discussion. The following officers were unanimously elected: President, Mr. B. W. Smith, Smethwick; Honorary Treasurer, Mr. Peter Simpson, Rugby; Honorary Secretary, Mr. C. Meiklejohn, Rugby; Auditors, Mr. C. Dakin, Cradley, and Mr. J. Brooks, Derby. Committee: Messrs. Hulse and Belton were elected to succeed Messrs. Hunt and Reeves, who retired. A very interesting part of this meeting was the presentation of a silver salver and antique cup, with an illuminated address, to Mr. Peter Simpson, on his retirement from active work, as a mark of the esteem in which he is held by the members of the Association, and in recognition of his very valued services as Honorary Treasurer of the Association for eleven years. The presentation was made by Mr. Charles Hunt, and very feelingly acknowledged by Mr. Simpson.

On behalf of the Committee,
B. W. SMITH, President.
C. MEIKLEJOHN, Hon. Secretary.

ALTERATION OF RULES.

Mr. W. LITTLEWOOD (Ex-President): In accordance with the notice of motion standing in my name on the *agenda* for this meeting, I beg to propose that Rule 2 be amended by the insertion of the word "Vice-President" after the word "President;" and this will, of course, necessitate a corresponding alteration of Rule 3. I am sure the members will recognize the advantage of the proposal, as the Vice-President will, in the natural course of things, follow the President. Meanwhile he will be getting conversant with the inner working of the Association, before being called upon to fill the office of President. Besides, in the absence of the President through any unavoidable cause, he would be expected to take the chair, and this would avoid the inconvenience of having to ask someone to preside at the last moment.

Mr. W. T. TEW (Warwick): I beg to second the proposed alteration, and I think it will be an improvement on the present rule.

The PRESIDENT: I quite endorse what has been said by the proposer and seconder of this resolution. It will certainly be much better to have some one to fall back upon in case of the unavoidable absence of the President, instead of having, as at present, to find a substitute at the last moment.

The resolution was unanimously carried.

Mr. P. SIMPSON (Honorary Treasurer): I would suggest that, in the consideration of the rules, it would be well to alter the mode of election, and that, instead of the present mode, papers should be sent out by the Secretary to each member prior to the meeting, with a list of the names of the various officers, as is done in connection with the larger Associations.

As this suggestion would involve another alteration of the rules, and would require previous notice, it was agreed to postpone its consideration until the next annual meeting.

On the recommendation of the Committee, the PRESIDENT proposed, and Mr. W. NORTH seconded, a resolution that the volume of District Association Reports be supplied to the members of the Association who are not in arrear.

This was unanimously carried.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—The position of President of such an important Association as ours is not an easy one, so far as regards finding suitable subjects upon which to give an address. Although time and science have both caused such rapid strides in the development of our business, nearly every detail has been so well thrashed out—either by previous addresses or by the papers which have been from time to time kindly given to, and well discussed by, this and other Associations—that it really becomes year by year a more difficult task to introduce anything fresh to impart to others.

The past year has been one of considerable anxiety to most of us. The excessive high price of coal and the low price obtained for residuals have hampered our results; and were it not for the continued increase in the demand for gas, the look-out would not be a bright one. It has no doubt been the means of sharpening our sense of economy, especially as the value of retort-house labour seemed to go up in conjunction with the rise of coal and the fall in the price received for residuals. On looking back for the past ten years, I find we are now paying 31 per cent. more for our coal; and although we have received about the same for coke, tar has fallen in value 56·69 per cent., ammoniacal liquor 64·48 per cent., and spent oxide 60 per cent., whilst retort-house wages have increased about 20 per cent. Perhaps these adverse circumstances have in a measure been for our good, inasmuch as they have led many to exercise extra vigilance in the improvement of their works, and not remain content to jog along in the old humdrum style, so long as the usual dividend or profit was forthcoming. I wish therefore to bring before your notice a few important points where economy has been, and still can be, effected in many of our works.

The handling of coal, in stacking, relifting, and conveying to the retort-house, is always a heavy item; but I think it will eventually be met by the introduction of conveyors or aerial ropeways. The former have already been adopted in some works with much advantage; but it has only been done in conjunction with other machinery. The vast improvements which have been made during the past few years in the various systems for heating the retorts on the most economical principle—whereby the fuel account alone can be reduced from 40 to 11 per cent., and even as low as 10 per cent., besides increasing the productive power of the retorts by allowing more frequent and heavier charges, and thereby giving a larger yield per mouthpiece and per ton of coal carbonized—have effected a great saving to many. Of course, much is to be said about the first cost of making the necessary alterations. Still, I feel sure that no one who has been able to persuade his board or committee to sanction the necessary expenditure, need have any fear as to the ultimate results. Inclined retorts are yet in their infancy; but they seem to have been taken up with considerable energy during the past year. Much has been done, and much more will be required before the profession as a body will be satisfied that they are a perfect success. Sufficient time, to my mind, has not yet elapsed for those works where they are in operation to give a decided opinion upon their working. The very great outlay in altering the retort-house, and renewing the whole of the pipes and fittings, will doubtless prove a serious obstacle in their way. Stoking machinery of various kinds—manual, steam, hydraulic, and compressed air—either for drawing or charging, has been introduced into many works; and this has no doubt been forced upon them by the strikes and the increase in the wages of the stokers. Supposing, even, that the machines did not reduce the cost of labour, the work is done much more efficiently, and consequently better results are produced.

Much loss and damage to the quantity and quality of the gas is caused by too rapid condensation; and in corroboration of this, I may say that, in making the alterations I have recently done at my works, I have had a good opportunity of ascertaining the great disadvantage of cooling the gas too rapidly—having had to allow it to go practically direct from the collecting-main to the condensers, where it has entered as high as 148° Fahr. I consider that, in so doing, I have lost quite half a candle of illuminating power, besides diminishing the yield of

gas. However, as soon as the winter has passed, I shall lose no time in completing the work, and altering this state of affairs. I have taken this opportunity of mentioning the matter, to put others on their guard in case they are working in this way. Many who work with a hydraulic main have too deep a seal; and I believe much loss is incurred through that. The less you can work with, the greater the amount of freedom for the gas, besides diminishing the work for the exhauster, and in a measure preventing stopped pipes and the pitching-up of the pipes. I have recently abandoned the hydraulic main, and now work with a throttle-valve to each H-pipe, which is connected to a dry main; and I must say I find very considerable advantage from the change. The temperature of the gas at the inlet and outlet of the condensers should be carefully watched, so that excessive changes do not take place. Sufficient attention is often not given to ascertain whether the washer or scrubber is really doing its duty; and to see that ammonia does not pass on to the purifiers, where it becomes of no commercial value. Although much improvement has lately been made in the various apparatus for extracting the ammonia in the gas, there are no doubt some works where this impurity is given a secondary consideration. Loss is often incurred by the mode of dealing with the ammoniacal liquor. Where carriage forms a serious item in the disposal of it, sulphate plant for working it up should be put down, as the saving would be found considerable. If otherwise disposed of, great care should be exercised in making contracts. The old system still much in vogue, of selling by degrees Twaddel, is much like its name. I have had a deal of experience in the various methods of testing; and have no hesitation in advising all who can to test and sell their liquor by the distillation test, which gives the absolute amount of ammonia it contains, and is more equitable to all parties concerned.

Although tar is not fetching the price that it did, I fear we are not as careful to collect all we make and to store it in the proper place provided for its reception—syphon-pots are allowed to overflow, and proper apparatus for arresting its progress to the purifiers omitted. These are little matters, but well worthy of attention.

Good purification is very important; and forms a fair item in many works, depending largely upon the method adopted. Much controversy and correspondence has taken place upon the subject. In some cases oxide only has been used; whilst in others all lime, or lime and oxide, and oxide and lime. The latter I consider the best and most economical, if you have no restrictions placed upon you. The admission of oxygen to the gas before entering the purifiers, appears to have met with considerable favour in many quarters; although the old process of allowing a small percentage of air is still much in use. When oxygen can be produced at a cheaper rate, I have little fear but that its use will become very general; for anything that will lessen the cost of labour, and save the loss of gas and the nuisance when changing material in the boxes, will be hailed as a boon by one and all of us. Until then, it is very necessary to select the best material of its kind—either oxide or lime; and in the case of the latter, great care should always be taken that it is properly slacked and well cooled down before it is used.

In every works, we have to generate steam for our engines, pumps, and other apparatus. The question has often arisen in my mind whether we are as careful as we should be to ascertain if our engines are working efficiently. Perhaps we should find, on their being tested, that we are wasting steam, and so causing a loss in fuel and water. I have effected an enormous saving by utilizing the breeze dust under my boilers with a forced draught. Since I made the alteration over two years ago, I have not used a pound of slack, coke, or breeze. There are others who have effected a like economy; and many more might do so, for if they do not produce sufficient breeze dust, then they can burn up the ashes which come from the furnaces, provided they first pick out the largest of the clinkers.

The leakage account always forms a source of worry to many, especially those in whose districts mining operations have been or are taking place; but where no such disturbances occur, there is no reason why the unaccounted-for gas should be as high as it is. We all know that a portion of it lies between the station and consumers' meters, caused by the difference of temperature at the points at which the gas is registered; but how much more is lost by neglected services and meters overworked, would astonish many. Yet there is another source—public lamps. Regulators are allowed to get out of order; and as a rule, I have found that the percentage of large lights predominate. Then the check which is kept upon the time of lighting and extinguishing is often a loose one. I have for some years past had in the centre of each lamplighter's "walk" a meter fixed at the base of one of the columns—taking care to have the regulator checked from time to time; and by the reading of this meter weekly, I have been enabled to check the lamplighters' time by the amount of gas consumed. During the winter months, the pressures should be taken at the various points of the district, with the object of ascertaining if the mains are large enough for the demand, and also to ensure equal distribution and enable the pressure at the station governor to be worked at a minimum; and then we can make any needed alteration in the summer months.

Much more could be done in pushing the sale of cookers and of gas-fires, by encouraging exhibitions and cooking lectures. Like other trades, we must advertise, and bring prominently before the notice of our customers the advantages to be derived by the use of gas cooking and heating appliances; but what we should study when introducing these appliances is that proper ventilation is taken into account, and not fix them at the risk of having them returned through defects of this kind. I think that the great improvements made in the various kinds of burners now being offered to the public, ought to allay any fear on our part as to the electric light superseding gas.

The development of the gas-engine during the past ten years has made such rapid progress as to greatly affect the question of the employment of suitable motors. By the successive improvements in its construction, by various inventors who have closely studied the importance of its future, this motive power has become firmly established in the high position which it now occupies amongst the prime-movers of the nineteenth century. Not only is it acknowledged as reliable for small powers, but it is also largely in demand for sizes of 100 indicated horse power and upwards. As to its efficiency and economy, ample proof is given by the great numbers which are superseding the steam-engine, especially in factories where each department is kept separate, and the motive power is now being subdivided. Besides, in many towns, where the space occupied by the boilers has become so valuable, the difficulty of disposing of the ashes, and the risk of fire and boiler explosions have all tended to bring the gas-engine prominently to the front. I am of opinion that it is incumbent upon us, as producers and sellers of gas, to give every assistance in our power to promote the use of these engines; and I feel sure it is only the unfortunate fact of our being at present unable to reduce the price of gas, which prevents their being more generally used.

Through the courtesy of Messrs. Tangyes, Limited, who have recently laid down an extensive plant to produce gas-engines on their well-known multiple system, I am able to invite the members to visit their works to-day, where they will have an opportunity of seeing for themselves the enormous business they are doing in this line. They have sent out during last year engines of this type, the total aggregate of which is equal to 5000 indicated horse power; to work and test which with the ordinary coal gas, has necessitated my Committee sanctioning the laying of a special 8-inch main direct from the outlet of the gasholders. The large meter-house they have constructed is ultimately intended for four 800-light and one 400-light wet meters; but for the present two of the larger size only are fixed. These are to be used solely for testing and motive power purposes. Each engine is tested to full power before leaving their works, and consumes from 15 to 24 cubic feet of gas per indicated horse power per hour, according to size. It is of the utmost importance that the gas should be kept at a perfectly even pressure while testing the large-sized engines. For this purpose, we have fixed, for their special use, an 8-inch station governor in the same house as the town governor; so that we can, at any time when desired, increase or decrease the pressure to their requirements without interfering with the district supply. But Messrs. Tangyes do not stop at this point. Even with the economical results they have obtained, it is difficult, so they say, for engines over 50 indicated horse power to compete with high-class expansion steam-engines, when the price of gas is more than (say) 1s. 6d. per 1000 cubic feet. A cheaper gas has therefore to be produced; and to this end, they have recently erected a large Dowson producer plant, capable of making gas at about one-quarter the thermal value of ordinary coal gas for 200 indicated horse power, produced from anthracite coal or gas coke. They find in practice that 1000 cubic feet of this gas can be generated for 3d., including all charges, with coal at 24s. per ton. It, however, requires about 50 per cent. more coke than coal to give the same results; and as four times the quantity of this gas is necessary, it is equal to coal gas at about 1s. per 1000 cubic feet.

I have also the pleasure of inviting you to inspect the works I have the honour of managing, where, during the past year, I have had to make considerable structural alterations and additions, to increase the productive power; and I thought it would be of some interest, prior to your visit this afternoon, to have a short description of what has been done. The Smethwick Local Board of Health gas undertaking was purchased from the Corporation of Birmingham; and the works, which were designed and built under the direction of Sir Frederick Bramwell, were started by me on October 1, 1881. They were constructed to produce a maximum daily make of about 750,000 cubic feet; but soon after we commenced making gas, it was found that the storeage and purifying power were inadequate, and an additional and larger gasholder and three lime boxes were put down the following year, under the direction of the same Engineer. Since that date, practically nothing was added to the manufacturing plant till last year.

Since 1881 the demand for gas had steadily increased from year to year; and at the close of 1891, it was found absolutely necessary to make further provision for a much larger daily output. After giving the matter most careful consideration as to what could be done—for it really meant either building an additional retort-house or else altering the interior of the present one—I came to the conclusion that if I adopted Klönne's regenerative furnaces, I should then be in a position to produce a daily make of 1½ millions (besides being able to save the great cost of building a new house), and also work with much greater

economy. By the end of February, I received the sanction of my Board to the following scheme: To pull down the present settings, discard the whole of the mouthpieces, pipes, and fittings in connection therewith, and rebuild and fit up with entirely new material. Also to erect an additional condenser for 750,000 cubic feet, an exhauster and engine combined for 60,000 cubic feet, a washer for 750,000 cubic feet, and a station meter for 30,000 cubic feet per hour—the latter having to be fixed in the offices I occupied. New offices had to be built, as well as providing a proper mess-room for the workmen.

The retort-house is 110 feet long by 56 feet wide inside dimensions, having on each side coal-sheds of the same length by 28 feet wide. There were eleven beds with seven retorts to each, 20 feet long by 20 in. by 16 in., ⏢-shaped, with an ordinary furnace to each side fired with slack; the main flue running on the top of the bench the full length of the house, connected to two wrought-iron chimneys lined with fire-bricks. Separate hydraulic mains were fitted to each bed, and connected to a 14-inch foul main by 6-inch valves. The gas and tar parted company at the centre of the house—the former passing up a 14-inch main on each side (which ran back half way), and then returning the whole length of the house to the condenser just outside. On account of the delay in obtaining permission to proceed, the alterations were not commenced till May 2; and on Sept. 15 we started to make gas with the first half of the new work.

After building a buttress against the outside wall of the fourth bed of the old settings (four beds being sufficient for the summer months), the whole of the other seven beds were pulled down, the pipes and fittings having been first removed by ourselves. The contractor had then to remove about 8 ft. 6 in. solid cement concrete, which formed the foundation of the old work, and was originally put in on account of the ground to that depth having been made up with ashes. Excavation was then carried on to a sufficient depth and width for the cellars on both sides, and to permit of 3 feet fresh concrete for a foundation for the new work; and where the chimneys came, an additional foot was put in.

The house was then divided into two benches—one with five, and the other with four beds. Separate chimneys were built at the end of each bench, but not bonded into the other brickwork, allowing of a 5-feet passage way between. The arches of the beds are 9 ft. wide by 17 ft. 3 in. high from the cellar floor. The outside walls are 2 ft. 9 in. thick, composed of hard brown bricks and a 9-inch fire-brick lining. The inner ones are 3 feet thick, including the 9-inch lining; and the piers 18 inches thick, all fire-brick. The arches have two 4½-inch rings, with 4½-inch relieving space, over which is a 4½-inch ring, and levelled up with hard brown bricks. The main flue is built up from the level of the cellar floor, running the length of each bench, and is composed of three 4½-inch rings of fire-work. The tops of the furnaces come up to a level with the retort-house floor, so as to charge with hot coke from the retorts.

The cellars are 8 ft. 6 in. wide by 7 ft. 9 in. high; and the floor overhead is composed of steel rolled joists 3 ft. 6 in. apart, with 4½-inch arches, turned in brick and cement, from girder to girder. They are levelled up with cement concrete; and then paved with hard bricks grouted in cement, having a fall of about 3 inches from the face of the settings, to throw off the water when extinguishing the coke. A drain is provided for contingencies, and runs the whole length of each side of the house, with catch-pits opposite each bed; and in the cellar floor, drains are likewise laid in a similar manner. Air-passages are made in the walls in the centre of each side and at each end of the house, for ventilation and carrying off the steam when cleaning the fires; so that, in whatever direction the wind may be, thorough and perfect ventilation is maintained. This is one of the most important points to be studied when constructing subways. The entrance to the cellar is by an inclined passage at one side of the house, at the bottom of which is an iron gate with a lock, the key of which the fireman alone uses. This, I think, is most desirable, to prevent any unauthorized person tampering with the air-slides or dampers.

The beds consist of eight ⏢ segmental retorts, 22 in. by 16 in. by 20 ft. long, with a 9-inch stop in the centre, fitted up with mouthpieces with patent self-sealing lids, and which are tied in with flange rails secured by cast-iron earpieces and bolted to the steel buckstaves. These are secured by cast-iron shoes bolted to the rolled joists opposite each pier (the thrust being transmitted to the wall of the house), and tied down to their work by a holding-down bolt and plate; the latter being built some feet down in the cellar wall. Each bed has a separate dry main, connected with 10-inch valves to a 14-inch collecting main at the back; the H-pipes having a throttle-valve to each, and this being worked by the stoker with a hanging rod attached by a hook to the corresponding mouthpiece. Wrought-iron plates are placed on both sides the full length, and up to the underside, of the bottom retorts of each bed, to throw off the water when quenching the coke, and also to prevent the water washing out the joints of the brickwork. I found this very necessary; for soon after we had been at work, the brickwork at this point began to show decided signs of perishing.

The retorts are charged every five hours with 3½ cwt. of coal per mouthpiece; each barrow-load being weighed by the wheeler before it is taken into the house. The machines and barrows are carefully checked morning and evening by the yard foreman. The drawing is done by a manual machine; and the charging, by shovel. When we first started to work, for some little time we had a number of stopped pipes, both in the ascension and H pipe by the throttle-valve, caused by an accumulation of sooty material and pitch—pointing to an excess of heat. The heats were reduced; and the sooty matter disappeared, but pitch still remained. I then had terrifiers made 5 inches in diameter; and kept a man during the day cleaning out the pipe at the outlet of the mouthpiece. After a short time, the pipes got clear; and since then we have seldom had any trouble. This clearly proves to me, that stopped pipes are mainly due to not keeping the outlet of the mouthpieces clean, using too small terrifiers, and not using them frequently enough. The make of gas is very much more uniform than by the old process. The exhauster works at one-tenth vacuum, which is about the same in the retorts; and the register-gauge gives practically a straight line during the 24 hours. In putting on or shutting down, we have found that the new work is much more simple and easier to manipulate. As each retort is charged or burnt off, the valve is opened or shut; and in the latter case, the lever of the lid is slacked as well.

During the week prior to Christmas, we produced, by increasing the weight of coal per charge to 3¾ cwt., more than 170,000 cubic feet of gas per bed per 24 hours, 10,800 cubic feet per mouthpiece, and 11,100 cubic feet per ton; maintaining the usual illuminating power with a small percentage of second-class cannel. In consequence of time not permitting us to complete more than five beds, we have had to make these produce all the gas required. Previously 154 mouthpieces did the work, as against only 80 this year, notwithstanding an increase over the last year in the consumption.

Time has not allowed me to prepare very much information; but I am able to give you a few statistics of the work done in the retort-house. It has taken 182,000 hard common bricks, 220,000 fire-bricks, 60 tons of lias lime, 12 tons of Portland cement, 260 tons of special furnace-blocks and retort-pieces, 112 tons of fire-clay, and 9 tons of fire cement, as well as 170 tons of iron-work. The total cost, excluding the sale of any of the old material, will be about £43 per mouthpiece.

I have made a few experiments to ascertain the temperatures at various points, the amount of primary and secondary air passing to each furnace, and the draught at the base of the chimney and on the damper of the furnace, which I thought would interest you. During these tests, we were using 10¾ lbs. of coke for every 100 lbs. of coal carbonized actually weighed; and the average temperature of the retorts was 1820° Fahr., with five-hour charges of 3½ cwt. per mouthpiece. The coal used was all screened; and the coke came out well burnt off.

Temperature in combustion chamber . .	2400°	Fahr.
,, ,, middle retort over ditto. .	1900°	,,
,, at exit from setting	1400°	,,
,, ,, main flue	770°	,,

These temperatures were taken by metals and the "alloys or metals," as no pyrometer could be obtained which would give anything like reliable information; and I shall be happy to show at the works the results produced on these metals in the combustion chamber.

Amount of primary air . . .	12,000	cubic feet per hour.
,, secondary air . . .	28,000	,, ,,
Draught at base of chimney . .	2-10ths	of an inch.
,, damper of furnaces .	1-10th	,,

In making these few remarks respecting the results I am obtaining, it is with the view of stimulating others to go and do likewise; for I do not claim any credit for perfecting or even improving the system I have adopted.

There are a few current topics upon which I ought to make some mention. The enrichment of gas by oil, in lieu of cannel coal, is now seriously engrossing the attention of most of us. I should much like some member who has been using the method for raising or maintaining the illuminating power, to be good enough to prepare a paper during my term of office, and give this Association the benefit of his experience; and more particularly to tell us whether during the past severe cold weather the results have been satisfactory. Water gas is still struggling along; but it does not meet with the support the shareholders have anxiously looked for. Many fresh patents have been taken out during the past year; but still it does not make much progress. There is, however, ample field for a supply of fuel gas of low illuminating power; but until the difficulty of expense in duplicating mains can be overcome, I fear it will be impossible for gas-works to undertake the supply. The electric light has made considerable progress of late; but I think we need have little fear of it yet affecting our business, as invariably where it has been largely used the gas consumption seems to have proportionately increased. The sale of gas to small consumers by the prepayment system continues to grow in favour in some towns; but until landlords see the importance of assisting us by fitting up their houses, and so improving their property and the comfort of their tenants, many will not undertake the responsibility of supplying this class of customer.

Much praise and credit are due to those engineers who, by careful study and hard work, have enabled us now to construct our gasholders and guide-framing on more scientific principles. Still, I think the tendency to storing up the gas in stupendous holders is somewhat a mistake, as accidents are liable to occur

when least expected; and the inconvenience and loss through one of these holders getting out of order is a serious matter.

Time will not allow me to detain you any longer, but I would wish to say how much we must all regret the sad accidents which have occurred in connection with tar-well explosions; and it certainly behoves all of us to use extra care to provide against such mishaps, by examining during next summer all tar-pits, syphons, and overflows, to ensure ample and sufficient seal, and to guard against any accumulation of gas in the wells. Ventilation may, in a measure, carry off any gas; but it will not prevent an explosive mixture. Do not allow hot coke to be tipped near any well; and of all things do not make a coke heap upon it.

In conclusion, I have to thank you, one and all, for the great honour you have conferred upon me by placing me in the presidential chair; and I sincerely trust that, with your kind co-operation during my term of office, the prestige of this Association will be in no way impaired.

Mr. LITTLEWOOD: I have great pleasure in proposing a very hearty vote of thanks to Mr. Smith for his very interesting, practical, and instructive address.

Mr. CHARLES HUNT (Birmingham): I rise with much pleasure to second this vote. At a time when there are so many Associations, and so many presidential addresses, it is not by any means an easy matter to find material which shall be both fresh and interesting for the purpose; and I congratulate the President in finding so much that is interesting and instructive, and within the compass of his own experience. When I knew that Mr. Smith was about to pull down and rebuild his works for the winter following, I thought it was a bold thing; but, from the description we have had from the President, and from what we shall see this afternoon when we visit the works at Smethwick, the course taken will, I am sure, be fully justified.

The motion was very heartily carried.

The PRESIDENT: I am considerably overwhelmed by the very kind way in which my address has been received; and, if any member gains anything by the record of my own experience, I shall be more than repaid. I thank you very much indeed.

PRESENTATION TO MR. SIMPSON.

The PRESIDENT said he had now the pleasure of calling upon Mr. Hunt to complete the presentation to Mr. Simpson.

Mr. HUNT remarked that the members would recollect that, at the last meeting, it was mentioned that an illuminated address was to have been included in the presentation to Mr. Simpson; and he had now pleasure in asking Mr. Simpson to accept it. The address was as follows:—

To PETER SIMPSON, *Esq.*

DEAR SIR,—We, the undersigned members of the Midland Association of Gas Managers, desire your acceptance of the accompanying silver salver and antique cup (dated 1757), in token of our high esteem and regard and as a slight recognition of your valuable services to the Association, as one of its oldest members, a Past-President, and its Treasurer for eleven years.

In your retirement from active work, we are glad to know that you will still remain a member of the Association; and our fervent wish is that you may be long spared to enjoy in happy usefulness your well-earned leisure.

(The address was signed by 47 members, subscribers to the testimonial.)

In asking you, Mr. Simpson (continued the speaker), to accept this address, I am sure I am but expressing the desire of every member, as well as my own, that the good wishes expressed therein will be more than fulfilled. The silver pencil-case which I have also the pleasure of handing you represents the balance of the fund.

Mr. SIMPSON: I am exceedingly obliged to you, and thank you most sincerely for your good wishes, as expressed in this very handsome address.

The PRESIDENT then welcomed, as a visitor, Mr. J. Hepworth, of Carlisle.

Mr. HEPWORTH having briefly acknowledged the courtesy of the President, the business closed.

The members then partook of luncheon, after which they were conveyed in saloon carriages from Snow Hill Station to Handsworth; arrangements having been made for the party to visit the extensive works of Tangyes Limited. At the Cornwall Works the party were received by Mr. H. Lincoln Tangye, Mr. Treglown, and Mr. C. Pinkney, and escorted over the larger portion of the works; being all much interested, particularly in the gas-engine department. After the inspection, they assembled in one of the rooms at the offices, in order to express their obligations to Messrs. Tangye for their kindness. The President asked the members to accord to Messrs. Tangye a hearty vote of thanks for the exceedingly courteous manner in which they had received them, and the splendid view they had given them of the improvements they had effected, not only as regarded steam-engines, but also the gas-engine. They were particularly interested in the latter, as it more deeply concerned the welfare of their profession. He felt sure that those who had seen what Messrs. Tangye had done in reference to the gas-engine would go away without any fear as to the future of this motive power. Mr. Hack (Saltley) seconded the motion; remarking that the inspection of the works had seemed to him almost like going round a town. It had been most interesting to them as gas engineers. With respect to gas-engines, he observed that Messrs. Tangye had greatly improved on the original idea. He was pleased to hear that their engines were capable of doing as good work as the "Otto," and that they were introducing them for electric lighting. It was gratifying to know that they had large orders, and that their business in this department was increasing. Mr. Lincoln Tangye, in acknowledging the resolution, apologized for the absence of his father (Mr. Richard Tangye) and his uncle (Mr. G. Tangye). On behalf of the firm, he said they were pleased to welcome the members of the Association. He was glad to know they had enjoyed their visit. They were making excellent progress in the sale of gas-engines, which were, after all, most important from their point of view.

The members subsequently paid a visit to the gas-works of the Smethwick Local Board, over which they were conducted by the President; and this brought the day's proceedings to a close.

THE RATE OF EXPLOSION IN GASES.

At the Meeting of the Royal Society on the 19th ult., Mr. HAROLD B. DIXON, M.A., F.R.S., Professor of Chemistry in the Owens College, Manchester, delivered the "Bakerian Lecture;" his subject being the rate of explosion in gases. The following is an abstract of the lecture:—

Berthelot's measurements of the rates of explosion of a number of gaseous mixtures have been confirmed. The rate of the explosion wave for each mixture is constant. It is independent of the diameter of the tube above a certain limit. The rate is not absolutely independent of the initial temperature and pressure of the gases. With rise of temperature, the rate falls; with rise of pressure, the rate increases. But above a certain *crucial pressure*, variations in pressure appear to have no effect.

In the explosion of carbonic oxide and oxygen in a long tube, the presence of steam has a marked effect on the rate. From measurements of the rate of explosion with different quantities of steam, the conclusion is drawn that, at the high temperature of the explosion wave, as well as in ordinary combustion, the oxidation of the carbonic oxide is effected by the interaction of the steam.

Inert gases are found to retard the explosion wave according to their volume and density. Within wide limits, an excess of one of the combustible gases has the same retarding effect as an inert gas (of the same volume and density) which can take no part in the reaction.

Measurements of the rate of explosion can be employed for determining the course of some chemical changes. In the explosion of a volatile carbon compound with oxygen, the gaseous carbon appears to burn first to carbonic oxide; and afterwards, if oxygen is present in excess, the carbonic oxide first formed burns to carbonic acid.

The theory proposed by Berthelot—that, in the explosion wave, the flame travels at the mean velocity of the products of combustion—although in agreement with the rates observed in a certain number of cases, does not account for the velocities found in other gaseous mixtures.

It seems probable that in the explosion wave (1) the gases are heated at *constant volume*, and not at *constant pressure*; (2) each layer of gas is raised in temperature *before* being burnt; (3) the wave is propagated not only by the movements of the burnt molecules, but also by those of the heated but yet unburnt molecules; (4) when the permanent volume of the gases is changed in the chemical reaction, an alteration of temperature is thereby caused which affects the velocity of the wave.

In a gas of the mean density and temperature calculated on these assumptions, a sound wave would travel at a velocity which nearly agrees with the observed rate of explosion in those cases where the products of combustion are perfect gases.

With mixtures in which steam is formed, the rate of explosion falls below the calculated rate of the sound wave. But when such mixtures are largely diluted with an inert gas, the calculated and found velocities coincide. It seems reasonable to suppose that, at the higher temperatures, the lowering of the rate of explosion is brought about by the dissociation of the steam, or by an increase in its specific heat, or by both of these causes.

The propagation of the explosion wave in gases must be accompanied by a very high pressure lasting for a very short time The experiments of MM. Mallard and Le Chatelier, as well as the author's, show the presence of these fugitive pressures. It is possible that data for calculating the pressures produced may be derived from a knowledge of the densities of the unburnt gases and of their rates of explosion.

Mr. E. Jones, of Ellesmere (Salop), has been appointed Gas Manager to the New Mills Local Board.

Death of Mrs. Mann.—We regret to record the death on Tuesday last, at her residence, Pembroke Villa, Wellesley Road, Gunnersbury, of Frances Jane, widow of the late William Mann, who was for many years Engineer of the City of London Gaslight and Coke Company. The deceased lady, who was in her 74th year, survived her husband only three years.

CRUDE CARBOLIC ACID.

The fear of an epidemic of cholera during the approaching summer has already begun to quicken the demand for carbolic acid and other tar products in use for disinfecting purposes. Much of the crude carbolic acid is comparatively valueless as a disinfectant; and in this respect the product of the distillation of brown coal is notably inferior to that from black coal. On the Continent, however, discrimination is seldom made between the two; and the less valuable article is sold, to the detriment of the price of the acid from English gas-works, where black coal is used. In two long articles in the *Chemiker Zeitung* for Jan. 28 and Feb. 1, Drs. Stockmeier and Thurnauer call attention to the inaccuracy of the ordinary methods of estimating phenol in the crude tar oils, and give some notion of the value of the latter for disinfecting. The method of shaking with soda-lye, and estimating the carbolic acid by the amount of oil unattacked, which is that recommended by the German Pharmacopœia, and generally adopted by the dealers, is condemned; and Toth's method of titration with bromine is regarded as decidedly preferable. A modification of the latter, to render it more rapid of execution, is proposed, and the results of determinations by the three systems compared, whereby it appears that Toth's method and the suggested modification give almost identical values—very much, however, below those guaranteed by the dealers who use the method of the pharmacopœia. But Toth assumes that the crude acids do not contain homologues of phenol; and consequently his results are erroneous, and doubly misleading, since Endemann has shown that these homologues have a higher disinfecting power than phenol itself. To ascertain the exact amount and nature of the phenols present in crude carbolic acids, the former were separated and fractionated; the results being checked by subsequent formation of the tri-brom derivatives, and estimation of the bromine therein. By this means the phenols from three samples of crude acid were found to be almost wholly meta and para-cresol; another sample contained one-fifth of higher homologues; and a fifth sample had a still larger proportion of high phenols. Toth's method gave in all cases lower values; but the method of the pharmacopæia, higher than the actual amounts. It is therefore concluded that, where accuracy is desired, there is no rapid method of estimation known at present, but that the lengthy process of fractionation must be resorted to. The so-called "60 per cent." carbolic acid contained about 49 per ent. of phenols; and the "100 per cent.," only 86 per cent.

The disinfecting value of the crude acids is then considered; an aqueous and a soap-solution extract being made for the determination. From the samples examined, an extract containing 5 per cent. of carbolic acid should in each case have been obtained; but even when allowance was made for the deficiency in the carbolic contents of the crude acids, the extracts were in all cases but one very far from the theoretical strength. The one exception was the soap-solution extract of a so-called 100 per cent. crude acid, which contained 4·25 per cent. instead of a theoretical 4·30 per cent. of carbolic oil. The other crude acids examined gave extracts with an average percentage of about 1·5 of carbolic oils. One sample only was, therefore, in reality, of value for disinfecting purposes; the sole right of the others to the name of disinfectants being their smell of carbolic acid, which might tend to a quieting effect in time of panic. Solutions of exact strength should alone be used; and the crude carbolic acids of commerce vary too much in character and composition to be of direct value. They, however, often contain considerable quantities of valuable disinfectants, such as cresols, &c.; and these should be recovered and made up to solutions of exact strength, whereby their disinfecting power could be readily ascertained.

A New Cement-Producing Mineral.—According to a correspondent of *The Times*, a discovery of great commercial importance, especially, to the Australasian colonies, has been made on Maria Island, a dependency of Tasmania. It consists of a practically inexhaustible deposit of carboniferous limestone, which, upon being treated, yields in itself, and without any admixture, a Portland cement of very high quality. Mr. H. Faija, M.Inst.C.E., has just completed an experiment with this material at the Rugby and Newbold Cement Works, which members of the Midland Association will remember having visited last May. Two tons of the raw stuff were treated by the dry process used at Rugby with highly satisfactory results. The analysis shows this material to be a normal uncalcined cement, and that when calcined it bears favourable comparison with the best English kinds. The cement made from this raw material was submitted hot from the mill to very severe tests by Mr. Faija, and did not show any indication of contraction or expansion. It is heavy—weighing 113 lbs. per bushel, and having a specific gravity of 3·152. It is of a slow-setting character; and, after lengthy immersion in water, it attains the hardness of basaltic rock. Tests made at the above-named works with this cement, after three weeks' exposure to the air, gave an average tensile strength of 620 lbs. per square inch from briquettes seven days old. From the accounts of geologists and others who have visited Maria Island, the deposits of the raw material appear to be inexhaustible.

REGISTER OF PATENTS.

Liquid-Meters.—Wright, F. G., of Kilburn. No. 2065; Feb. 3, 1892.

This invention relates to an absolute liquid-meter, in which two measuring chambers are employed, into which the liquid enters, and from which it is discharged by plugs or pistons working in the chambers, with inlets and outlets therein, so contrived and operated that the piston in one chamber is at rest while the other is discharging and refilling.

Igniting-Tubes for Gas-Engines.—Harris, A., of Middlesbrough. No. 3165; Feb. 18, 1892.

This is claimed to be an "improved device, by which the ignition of the explosive mixture used in gas, petroleum, and vapour engines is rendered more certain and efficient, the life of the igniting tube or compartment is prolonged, and the formation of protoxide or other non-conducting substance on the igniting surface is obviated."

At a convenient position on the igniting-tube is fitted a chamber, in the form of a shell of a cock, into which the igniting-tube is fixed, in such manner that the shell extends beyond the tube. Inside this shell is a hollow plug, open ended at the large end, but solid, and provided with a nut and washer, and also a square by which it may be turned, at the smaller end. Perforations in the shell communicate to the tube, above and below, and also through the plug. The large end of the shell is closed with a blank end. Outside the tube, preferably at the larger end, are apertures at the top and bottom and corresponding apertures in the plug, by which a through opening can be effected by turning the plug, and closed by the reverse action, at will, by means of the square. Beneath the lower aperture in the shell is a gas-jet or its equivalent. Through the blank end of the shell, there is fitted a hollow metal socket, to the end of which is secured a close-ended platinum tube, in such a position that it will be heated by the gas-jet through the aperture in the bottom of the shell, and the products of combustion escape through the top aperture. Outside the blank end of the shell, a perforation is provided in the socket through its side; and to the outside end of the socket a tube is connected, through which a mixture of air and gas is forced. This impinges upon the inner walls of the platinum tube; and, after it has been heated by the gas-jet, causes it to become incandescent and remain so by intermolecular combustion—the residuum escaping by the perforation in the socket outside the shell. The engine may now be started; and the heat, striking through from the interior of the tube, ignites the explosive charge.

Gas-Engines.—Pinkney, C. W., of Smethwick. No. 3203; Feb. 18, 1892.

This invention relates more especially to large gas-engines, wherein it is desirable to provide means for starting them by one explosion, without the repetition of explosions necessary when the gas and air forming the explosive charge is at or about atmospheric pressure.

A pump, or equivalent forcing-device, is placed in connection with the combustion chamber, to force a mixture of gas and air into the combustion chamber, until there is obtained an explosive charge at a pressure sufficient to enable the explosion of the one charge to effect the starting of the engine—say, for instance, 10 lbs. to the square inch above atmospheric pressure—and in communication with the passage by which the mixture is delivered from the pump to the combustion chamber, there is a passage (controlled by a valve or cock) leading to an igniter. As there is already air in the combustion chamber, a strong mixture of air and gas may be so forced in that, just before the explosion is to occur, it will reduce the strength of the mixture being pumped, so that it becomes explosive at the time the desired pressure is reached. The explosion then takes place, and starts the engine, by causing an impulse sufficient for the purpose; and thereafter, the ordinary supply and ignition arrangements for normal working are brought into action.

A convenient arrangement, says the inventor, consists of a pump, with inlet and discharge valves, for drawing in the gaseous mixture and passing it through a passage to the combustion chamber, with which passage the igniter communicates. The inlet for the gas is preferably made through a number of perforations around the seat of the gas and air inlet-valve; so that the gas and air are properly mixed. The pumping is continued until sufficient gaseous mixture is forced into the combustion chamber, to give the requisite pressure to enable the explosion of the one charge to start the engine. If the mixture first pumped in has been a strong one, the quantity of gas is reduced (by partly closing a cock on the gas-supply pipe) towards the end of the pumping, to make the mixture in the passage with which the igniter communicates explosive when the necessary pressure is reached. A relief-valve may be provided, "weighted" so as to open and give a signal when the necessary pressure is reached. The gaseous mixture will then be ignited; and an explosion will occur of sufficient force to start the engine. When the engine is started, the passages from the pump (and to the igniter, if necessary) are closed; the closing of the passage from the pump being effected by holding the outlet-valve to its seat, or else a special valve may be provided for the purpose in the passage leading into the combustion chamber.

Making Gas from Oils and Fatty Substances.—Moeller, J., of Streatham, S.W. No. 4728; March 10, 1892.

This invention relates to apparatus for the manufacture of oil gas, consisting of an air compressing-pump and receiver, communicating with an oil reservoir; and a U-shaped retort, into one limb of which enters a pipe from the oil reservoir, terminating in a small orifice, and from the other limb of which a pipe leads to a purifier consisting of a volute passage charged with water, and above it a scrubber containing wet pumice-stone. The gas entering at the bottom part is first washed and cooled. It is further cleansed in passing through the pumice-stone and cooled by the water contained in the cylindrical tank. On the top of this is a funnel and syphon, into which water is poured, and washes down the tar, which goes to the bottom tank, swimming on the top of the water. When a certain amount of this tar has collected, there is a syphon-tube in the centre part, through which the excess of tar can be drawn off and fresh water added in the top bell through the syphon-

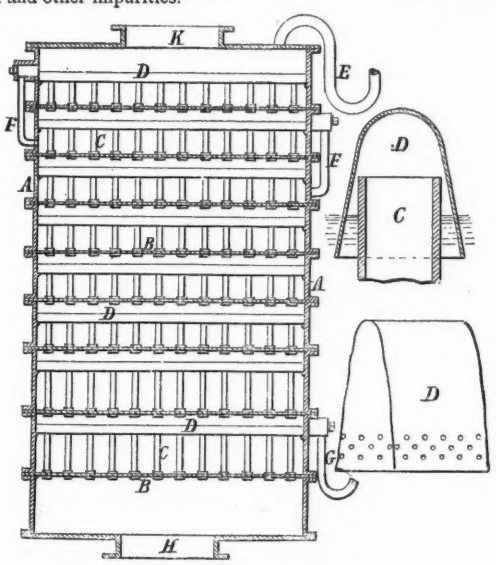
shaped tube, which always retains a surplus of water, so that it is always sealed against an escape of gas. Apparatus of this description answers in all cases where oils are used for the production of gas; but in case fatty substances of a solid nature have to be employed, these fats must be melted before introducing them into the retorts.

Gas-Engines.—Weyman, J. E., and Drake, A. J. and J. A., of Guildford. No. 4735; March 10, 1892.

The object of this invention is to lessen or deaden the noise caused by the exhausted gases as they escape from the cylinders of gas motors into the atmosphere, by providing a chamber, or succession of chambers, into which the exhaust from the cylinder has to pass before it is discharged. The chambers are so formed and placed as to receive the gases as they are exhausted from the cylinder. Between the first and second chamber is a passage controlled by a valve, worked by the engine or other means, so as to open and close the communication between the first and second chamber at intervals corresponding with the strokes of the engine. The passage is closed between the first and second chamber during the time the exhaust from the cylinder passes into the first chamber; and being opened immediately afterwards, when expansion of the exhaust gases in the first chamber has taken place, the exhaust gases are allowed to pass into the second chamber and thence into the atmosphere without noise. To provide for explosions which might occur in the first chamber, the valve which controls the passage between the two chambers is made with a spring, by means of which the gas may find vent through the passage independently of the ordinary action of the valve.

Gas-Washer.—Hunt, C., of Birmingham. No. 6000; March 28, 1892.

This invention relates to apparatus for washing gas, by causing it to pass in subdivided streams through water, in which the ammoniacal, tarry, and other impurities are retained. For this purpose, the vessel is divided by horizontal partitions into a number of compartments, in each of which water is maintained at a constant level. Through each partition several tubes, arranged in rows, pass upwards to a height a little above the water-level in the compartment above; and over each row of these tubes (which are open at the top) is placed a hood, in the form of an inverted trough, having its edges perforated with numerous small holes, which, when the trough is in position, are immersed in the water. The uppermost compartment being supplied with water, and each of the compartments below being supplied by overflow from that above it, gas, admitted into a space below the lowest partition, travels up the tubes into the hoods, and, passing through the small holes, bubbles up through the water into the space above the water in the lowest compartment. Thence it passes through the next set of tubes and hoods; and so on, from compartment to compartment, until it issues from the uppermost compartment in a washed condition—the liquid overflow from the lowest compartment containing the ammoniacal and other impurities.



The illustration shows a vertical section of the apparatus, and one of the tubes with hood, and a side view of one of the hoods.

A is the vessel, divided by horizontal partitions B into numerous compartments. Through each of the partitions pass a number of parallel rows of tubes, open at both ends, secured tightly in the partition by nuts, as shown, or by expanding them in the manner of boiler-plates, or otherwise. Over each row of tubes is placed a hood D, like an inverted U-trough, having the lower parts of its limbs perforated with numerous holes. Water is supplied at E to the uppermost compartment, whence, on attaining such a level as to submerge the perforated parts of the hood, it overflows by a branch F to the next compartment below. By branches like F (which are not shown), all the compartments are respectively connected to the compartments immediately below them; so that, while water is supplied at E, all the compartments are charged to like level—the overflow from the lowest compartment issuing at G. Gas enters the vessel at H, below the lowest compartment; passes up through the first tier of tubes C; issues through the perforations of the lowest set of hoods D; and bubbles in a subdivided condition through the water in the lowest compartment. It thus passes from compartment to compartment, until it finally issues at K from the uppermost compartment.

The invention claimed is for "gas-washing apparatus, consisting of a vessel divided by horizontal partitions into numerous compartments, and rows of open tubes passing through each partition, and covered each row by a hood like an inverted U-trough, having its lower limbs perforated or serrated, with suitable connections for supply of water to the uppermost compartment, its overflow from compartment to compartment, and its issue from the lowest, and an inlet below and an outlet above for gas."

Tapping Mains.—Payne, W. S., of Fostoria (Ohio), U.S.A. No. 18,364; Oct. 13, 1892.

This apparatus for tapping mains is arranged to be readily and quickly adjusted upon saddles of different sizes, according to the size of the main to be tapped; and will (it is claimed) not only drill and tap against or under the pressure of water or other liquid or gas pipes, but will also provide a support and guide for the drill-shank and tap and the cock to be secured within the tapped main after the drilling of the hole therein has been completed, and means whereby the cock may be easily thrown into position over the drilled hole, and held in such position while being screwed therein.

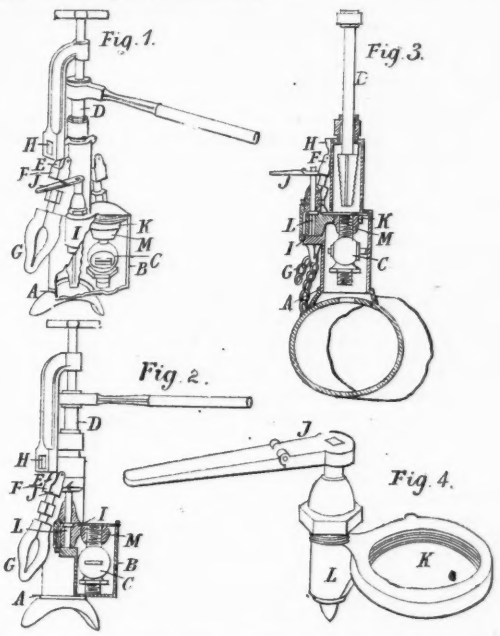


Fig. 1 is a perspective view, partly in section, of the tapping machine. Fig. 2 is a vertical sectional view, taken diagonally across the casing and the swinging crane located therein. Fig. 3 is a similar view, partly in elevation, with the device secured upon a main and the swinging crane holding the cock over the drilled hole, and in position for being screwed therein. Fig. 4 is a detail in perspective of the swinging crane and the operating handle.

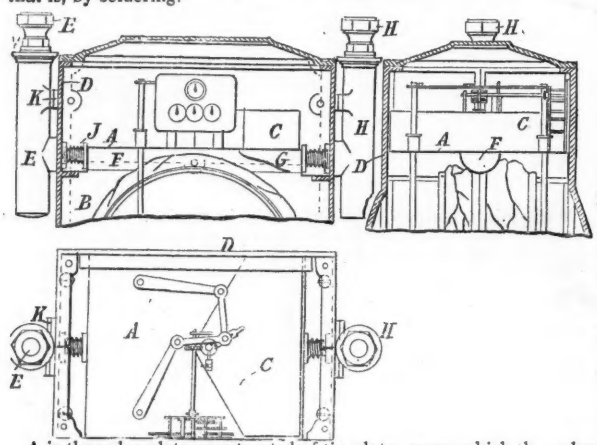
This device consists of a hollow casting, somewhat elliptical in shape, and provided with a bottom eccentrically-located opening, from which depends a downwardly-extending flange. This flange is designed to be secured within the collar A of the saddle, by the pressure secured by the chain and tightening-bolts; the saddle being made of a size to accommodate the size of main upon which it is designed to be seated, and between which and the saddle suitable gaskets are interposed, when the device is clamped upon the main for the purpose of ensuring a perfect joint, so that there may be no escape or leak between the jointed parts. The casing forms a chamber B, designed to accommodate the cock C in position and out of the way while the main is being tapped. Directly over the opening in the bottom of the casing is a top opening, from which an upwardly-extending neck extends. It is designed to accommodate the movement of the drill-rod D, working therein, and provided at its lower end, within the casing, with an ordinary tapered screw-threaded tap, which, after drilling the hole in the main, is withdrawn up within the neck and out of the way, while the cock C may be swung into position over the opening. Secured to the top of the neck, is a malleable clamp extension, above the top of which is screwed an ordinary stuffing-box, having an interior bore of the same diameter as the drill-rod, which slides and works therein, and thus ensures a tight joint. The clamp is provided with the opposite lateral ribs E, to which are pivotally secured the clevises F, internally threaded to accommodate one end of right-and-left screw-threaded adjusting-bolts which engage the clevises and the inner ends of the chain-harps G, provided with enlarged openings terminating in reduced elongated openings, designed, after the links of the chain shown are inserted in the enlarged openings of the harps, to receive the links edgewise, and thus securely hold the chain in position beneath the main. This encircles and prevents the chain slipping, while the adjusting-bolts secure the device upon the main as tightly as may be desired. The clamp is further provided with the laterally, and oppositely extending, engaging lugs H, upon which a feeder-yoke may be removably attached. This feeder-yoke is provided with a squared perforation adapted to take either of the lugs, as may be desired; while the upper curved end of it is provided with an interiorly-threaded perforation, designed to accommodate the feeder-screw which bears upon the top of the drill D, which is rotated under the action of an ordinary pawl and ratchet lever. A semicircular enlargement I is formed upon one side of the casing, near the top edge, and intermediate of the chamber or recess B and the portion of the casing in which the combined tap and drill works. The upper end of his enlargement is provided with a screw perforation, designed to receive a stuffing-box, with a rotating stem or shaft revolving therein.

The lower end of the stem is provided with a squared portion, while its upper end, without the stuffing-box, is provided with the operating handle or lever J, hinged near its connection with the stem, whereby, when not in use, it may be folded over upon itself and out of the way. An interiorly-threaded ring or crane K is provided, with an extended perforated lug L, having a squared perforation therein, designed to receive the squared end of the rotating shaft or stem within the semicircular enlargement or recess I, which is of sufficient size to accommodate the enlarged perforated lug of the threaded ring or crane, and is provided in the bottom with a bearing recess adapted to receive the lower end of the operating stem or shaft just referred to.

In its normal position, the crane or ring is adapted to be located near the top of the enclosed recess or chamber B of the casing of the machine, and is arranged to receive and hold the internally and exteriorly threaded mandrel M, within which is screwed the cock C, which is adapted to be held vertically within the recess B, and supported therein by the mandrel. After having drilled the hole in the main and tapped the same, the combined tap and drill is drawn up into the machine as far as possible through the neck and stuffing-box through which it works. The operating handle or lever is then opened, and the crane or ring is swung round over the opening in the bottom of the casing; so that the cock and the mandrel carried thereby comes immediately under the tap and drill. The tap and drill are then pushed down and screwed into the mandrel until tight therein; and by continuing the screwing of the tap and drill, the mandrel carrying the cock is screwed out of the crane. When it is thus released, the cock is pushed down into the opening in the main and screwed therein by means of the tap, using, of course, the ratchet to turn it with. Having now loosened up the chain and taken the machine off the main, a wrench is put on to the cock to screw it securely into the main, after which the tap and mandrel may be unscrewed from the top of the cock.

Gas-Meters.—Cowan, W. H., of Edinburgh. No. 20,246; Nov. 10, 1892.

Iron cased dry gas-meters as at present constructed, the patentee remarks, usually have the valve-plate cast as part of the iron case; the valve-seats, as well as the boxing-in cover for the valves, being fixed upon the cast-iron valve-plate by screws and puttied joints. This method of fixing the valve-seats and valves boxing-in cover has been round defective, by leakage occurring through the joints; and in accordance with the present invention, it is proposed to construct the valve-plate of tin plate, and to fix the valve-seats and the valves boxing-in cover thereon in the same way as in the ordinary tin-cased dry gas-meters—that is, by soldering.



A is the valve-plate, constructed of tin plate, upon which the valve are mounted; the plate forming the division between the diaphragm chamber B and the upper part of the meter containing the valves and index-gearing. C is the valve-box. The valve-plate may be fixed to the iron casing D in any convenient manner, such as by forming the plate with a flange attached to the ledge of the casing by screws. E is the outside gas inlet-pipe; F, the under gas-tube of the valve-plate A, leading the gas to the valves; and G, the gas outlet from the valves, and leading to the outside gas outlet-pipe H. The outside gas inlet-pipe may be connected to the under tube of the valve-plate by the brass connection J (attached to the side of the valve-plate), and passed through the o uter iron casing D. The outside inlet-pipe is then screwed on to the end of the connection J; the whole being tightened up by the nut, and further secured in position by a screwed attachment at K. The outlet-pipe may be attached to the iron casing in a similar manner. By leaving the space shown between the side of the valve-plate A and the outer iron casing, the connections can be readily made. Also, by this arrangement, the connection J is kept outside the gas or diaphragm chamber.

APPLICATIONS FOR LETTERS PATENT.

2590.—Hawkhurst, T. S. K., "Solid illuminant." Feb. 6.
2665.—Dietrich, R., "Regenerative furnaces." Feb. 7.
2716.—Askins, J., "Manufacture of gas." Feb. 7.
2788.—Evans, E. W., "Gas-engines." Feb. 8.
2791.—Fanta, F., "Continuous production of water gas." Feb. 8.
2801.—Denayrouze, L., "Incandescence gas-burners." Feb. 8.
2816.—Thompson, W. P., "Liquid-meters." A communication from G. E. Samain. Feb. 8.
2840.—Turner, J., "Purification and utilization of sewage, and in producing gas." Feb. 9.
2851.—Bellamy, A. R., "Gas and similar motor engines." Feb. 9.
2961.—Hawkyard, J., and Braddock, J., "Station gas-governors." Feb. 10.
2985.—Terrace, D., "Retort-lid fastenings." Feb. 10.
3011.—Derichs, T., "Liquid-meters." Feb. 10.
3093.—Sykes, M. L., and Walker, W., "Valves for gas, water, and other fluids." Feb. 11.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Investment of Reserve Funds.

Sir,—Your correspondent "A Secretary," in his letter of the 9th inst., puts two questions: (1) Is it wise to realize and re-invest your reserve fund if the security in which it is invested should rise to a premium above the price at which you purchased it? (2) If you do realize and re-invest, how should you state your account afterwards?

As to the first question, I think it is almost impossible to lay down a general rule. The advisability of varying an investment must depend upon the special circumstances of each case. Such a course, however, is one which should only be taken with extreme circumspection, and after a very careful consideration of all contingencies. Several years ago, I recommended a company whose reserve fund was invested in the 3 per cent. Consols to change it into the 2½ per cents. The prospective advantages of the latter security were not then, perhaps, fully recognized by the general public. The 3 per cents. were standing at about par, and the 2½ per cents. at about 83; the annual return for money being thus about the same from each. But the 3 per cents. never rose above 103⅜, and were then extinguished; while the 2½ per cents. have risen to 98, which is equivalent to an advance of 18 per cent. upon the then price of 83. It is not often, however, that an opportunity presents itself for effecting so sound and safe an operation as this—an operation which had for its object, not that which is sought by your correspondent—viz., an immediate increase of income—but rather the ultimate advantages which are now patent to all.

As I said in my previous letter, directors are not responsible for a rise or fall in the value of any authorized security in which they have invested their reserve fund; and they will do well to rest content when they have a good one. *Le mieux est l'ennemi du bien.* But, if they voluntarily quit a safe position, and begin to speculate upon a rise or fall with a view to increasing their income, they may be taking upon themselves a degree of responsibility not otherwise imposed upon them. Therefore, if your correspondent desires advice, I should say "Don't." It is very rarely, if ever, that one can get ¼ per cent. better income out of one security than out of any other of a similar class. They generally rise and fall in price together. It *may* be done by substituting a security which is not quite so good as the one you have; but that involves the *premier pas* on to dangerous ground.

As to your correspondent's second question. The measure of a reserve fund is the cash figure which stands to its credit. In the case of your correspondent, it is £5000—that being the full statutory maximum allowed him by the Gas-Works Clauses Act, 1847, which governs him. He may sell out and re-invest a score of times; but whatever may be the investment for the time being of his reserve fund, that it is which represents £5000 cash on his books. And whether the income derived from time to time from each varied investment be greater or less, the whole of it (without distinction of any portion which may be attributable to an advantageous change of investment) is to be applied to any of the general purposes of the undertaking. If he should require to take £1000 out of his reserve fund to make up his dividend, then assuming the fund to be invested in Consols, and, taking the price at 99, he will sell out about £1015 Consols, or whatever may be the exact amount which, less stamp and commission, will produce £1000 cash. This £1000 will be credited to profit and loss and debited to reserve fund, and the balance of Consols left remaining will represent the £4000 cash now standing to the credit of the reserve fund. Whenever he is able to restore the reserve fund to its maximum, he will take £1000 cash out of profit and loss, and will therewith purchase such an amount of Consols as the price of the day will permit; and the total amount of Consols now attained will represent the £5000 cash now standing to credit of reserve fund, whether such total amount be greater or less than that which previously formed the investment of his £5000 cash, before he had reduced to £4000 in order to make up the dividend.

Commercial Gas Company, Stepney, E., Feb. 17, 1893. H. D. Ellis.

Sir,—I have read and re-read the letter of your correspondent "A Secretary," and I am still in doubt whether I can see the precise point he wishes to raise; but I will answer it in the best way I can.

All gas funds under Acts of Parliament must be invested in their nominal value, and not in their market value, as the first is permanent, while the last may vary every day. When the fund is made up to the full amount, it cannot be increased, but the income accruing therefrom must be brought into the general account; and when any part of it is sold, any profit arising from the transaction must be dealt with in the same way.

When a fund is, as it is admitted to be in this case, well invested, it is not desirable to change it, as, all investments being subject to variations in their market value, it might be altered from a good investment to a bad one. In altering investments, greater consideration should be given to the income received therefrom than to the market value; and if the undertaking is not benefited by the alteration, it ought not to be made. Under all circumstances, the £5000 in this case would be the maximum limit allowed, and any profit arising from the change would have, as stated above, to be brought into the general account. But supposing that, after the change had been made, it became necessary to sell out a portion, and there was a loss of £500, it ought, in good faith, to be made up to the general undertaking.

A reserve fund, when reduced for any legitimate purpose, may be made up again and again as often as it occurs. All premiums, from whatever source received, should be brought into the general account, and not be taken out of it except in the ordinary way, and not be specially applied for this or that purpose.

76, Palace Chambers, Westminster, S.W. W. Livesey.
Feb. 20, 1893.

Cleaning Dirty Waste.

Sir,—It may interest some of your readers to know that we have tried at these works a very simple means of cleaning dirty waste.

When we charge a purifier, a shallow pan is placed on top of the charge, and a few sticks laid across it. The dirty waste is put upon these, and the cover let down. The gas is then passed through in the ordinary way; and when the cover is raised, in a week or more, the oil is found in the tin, and the waste comparatively free from it, and well fitted for wiping tarry fingers and other dirty work. It is perhaps as well to mention that it is not desirable to put waste into a purifier that is not to be charged with gas at once; as, under favourable circumstances, it is apt to heat, and might possibly cause an explosion.

Bournemouth Gas and Water Works,
Feb. 18, 1893. W. J. FULLER, F.I.C.

Gas Desulphurization Company, Limited.—A Company has been registered under the above title, with a capital of £15,000, in £10 shares, to acquire certain patents relating to an improved process of desulphurizing gaseous products, and to turn them to account in such manner as the Company may deem expedient.

The Projected Electric Lighting of the Victoria Embankment.—At the meeting of the London County Council last Tuesday, it was agreed, on the recommendation of the Parliamentary Committee, that £5000 additional expenditure should be authorized in their General Powers Bill, which provides for lighting the Victoria Embankment and Gardens, as well as Westminster and Waterloo Bridges, by electricity.

The Repayment of Loans for Water-Works Purposes.—Last Friday, at a meeting of the Leeds Corporation Finance Committee, a report was presented with reference to the proposed loan of £100,000 for water-works improvements. It was stated that the ordinary term for repayment was 30 years; but that the Local Government Board had decided that, if the money came out of the reserve fund, it might be repaid as follows: £74,000 in 40 years, £6000 in 30 years; the balance to be subsequently arranged.

Barnet District Gas and Water Company.—In the report to be presented to the proprietors at their half-yearly general meeting next Friday, the Directors of this Company state that the balance available for division is £14,919, out of which they recommend the declaration of a dividend (less income-tax), for the six months ending Dec. 31 last, at the rate of 8½ per cent. per annum on the "A" and "C" stocks, 7½ per cent. per annum on the "B" stock, and £5 19s. per cent. per annum on the "D" (water) shares. They add that the business of the Company continues to progress.

Cagliari Gas and Water Company, Limited.—At the annual meeting of this Company to-day, a very satisfactory statement will be laid before the shareholders by the Directors. The receipts on revenue account for the past year amount to £24,372; and the expenditure to £11,931—leaving, after the usual deduction for sinking fund and a further £1000 to the reserve fund, a net revenue of £12,441. The amount available for dividend, including the balance brought forward from the previous year, is £17,036, out of which an interim dividend at the rate of 6 per cent. per annum has been paid. The Directors now recommend a further payment at the rate of 8 per cent. per annum for the past half year, which will make a dividend for the year of 7 per cent., absorbing £10,500. A bonus of 5s. per share is also recommended; and, after paying this, a balance of £4661 will remain to be carried forward.

The Use of Prepayment Meters in Liverpool.—In the JOURNAL last week reference was made to the large increase which has taken place in the use of prepayment gas-meters in Liverpool; there being 7270 at present in operation in the city. The figures we published were given by Mr. J. Grisenthwaite in the course of some remarks made by him when presiding at the annual dinner of the inspectors of the Liverpool Gas Company. He stated that he anticipated that by this time next year there would be 13,000 at the very least in use, as these meters had, he said, become more than novelties, and would, in his opinion, be the future medium for introducing gas lighting into small cottage property. He claimed for the Company that they had done more than any other in the United Kingdom to introduce and supply gas through automatic meters; and he thought that, by so doing, they had conferred a great boon upon small consumers.

The Price of Gas at Manchester.—A deputation from the Manchester and Salford Noxious Vapours Association waited upon the Gas Committee of the Manchester Corporation last Friday week, and presented a memorial in favour of a reduction in the price of gas for heating purposes and motive power. The Secretary of the Association (Mr. F. Scott) read the memorial, which he said had been signed by about 5000 gas consumers and ratepayers of the city, and which suggested that the price of gas should be reduced at least 6d. per 1000 cubic feet for heating purposes and motive power. Mr. H. Philips said the Association regarded the question simply from the health point of view. There was no doubt, if gas could be so cheapened as to enable it to be used in warehouses and other places in the city, the dense fogs and unhealthy quality of the atmosphere would be greatly lessened. Another member of the deputation said his firm paid last year £277 for gas. Of this amount £125 was for motive power; and they thought they paid sufficient in the way of rates without being called upon to meet the heavy tax for gas. Considering the enormous profits made by the Gas Committee, he looked upon the reduction asked for as a slight one. After several other members of the deputation had spoken, Mr. Gibson, the Deputy-Chairman of the Committee, said the question had been under their earnest consideration for many months. They had to regard the matter from all sides; and it was difficult to come to a decision. Mr. J. Brooks, the Chairman of the Committee, said that this was a question of £ *s. d.*; and to advocate the supply of gas at 2s. to one individual and 2s. 6d. to another, was very defective logic, in his view. The question of the price had exercised the minds of the Committee for some time, and would continue to do so. They had recommended a much bolder measure than was put before them in the lowering of the price 3d. per 1000 feet in all cases; but their recommendation was not approved by the Council. They were not inimical to the objects of the deputation; and they acknowledged the courtesy with which the subject had been introduced. Mr. Philips thanked the Committee for the interview, and the deputation then retired.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Accrington Gas and Water Bill; Crystal Palace District Gas Bill; Imperial Continental Gas Association Bill; New Swindon Gas Bill; Wolverhampton Gas Bill.

Bills read a second time: Accrington Gas and Water Bill; Belfast Water Bill; Bilston Water Bill; Crystal Palace Gas Bill; Dublin Corporation Bill; Frimley and Farnborough District Water Bill; Ilkley Local Board Bill; Imperial Continental Gas Association Bill; New Swindon Gas Bill; Pontypridd Local Board Gas Bill; Rathmines and Rathgar Water and Improvement Bill; Runcorn Water Bill; Sheffield Coporation Water Bill; Stockton-on-Tees Corporation Gas Bill; Todmorden Local Board Gas Purchases Bill; Weaver Navigation Bill; Wolverhampton Gas Bill.

Bills committed: Ilkley Local Board Bill.

Bills withdrawn: Chatham Corporation Water Bill; Rochester Extension and Water Bill.

Petitions against the following Bills were presented:—

Accrington Gas and Water Bill, from the Corporation of Accrington, and the Local Boards of Church, Clayton-le-Moors, Great Harwood, and Rishton.

Belfast Water Bill, from the Earl of Annesley and the Marquis of Downshire.

Bilston Commissioners Water Bill, from the Staffordshire and Worcestershire Canal Company and others, and Guardians of the Seisdon Union.

Crystal Palace District Gas Bill, from London County Council.

Frimley and Farnborough District Water Bill, from James Simonds.

New Swindon Gas Bill, from Swindon New Town Local Board.

Stockton-on-Tees Corporation Gas Bill, from the Stockton Union Rural Sanitary Authority.

Weaver Navigation Bill, from the Northwich Gas Company.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Altrincham Gas Bill; Brighton and Hove Gas Bill; Devonport Water Bill; East London Water Bill.

Bills read a second time and committed: Aberdeen Corporation Bill; Barnoldswick Local Board Bill; Barry and Cadoxton Local Board Bill; East Stonehouse Water Bill; Liverpool Corporation Bill; Plymouth Corporation Water Bill; St. Helens Corporation Bill; Stirling Water Bill; West Hampshire Water Bill.

Petitions against the following Bills were presented:—

Aberdeen Corporation Bill, from the County Council of Aberdeen and the Deeside District Committee, and from the Commissioners of Police of Ballater.

Altrincham Gas Bill, from the Highway Board of East Bucklow.

Barry and Cadoxton Local Board Bill, from the Barry and Cadoxton Gas and Water Company.

Brighton and Hove Gas Bill, from the Corporation of Brighton, and from engineers and others in Brighton and Hove.

Brighton Electric Lighting Bill, from the Corporation of Brighton.

Devonport Water Bill, from the Right Hon. Sir Massey Lopes, the Corporation of Plymouth, and the East Stonehouse Local Board.

East London Water Bill from the Barking Town, East Ham, and Walthamstow Local Boards, Poplar District Board of Works, the Leyton Local Board, the London County Council, the Corporations of London and West Ham, and Owners, &c., of Lammas Rights in Leyton Marshes and others.

East Stonehouse Water Bill, from the Right Hon. Sir Massey Lopes, the Earl of Morley, the Midland Roborough Highway Board, the Corporation of Plymouth, and the Devonport Water Company.

Goole and District Gas and Water Bill, from the Corporation of the Level of Hatfield Chase.

Greenock Corporation, from the County Councils of Renfrew and Dumbarton, the Corporation of Glasgow, and a number of other public bodies, Owners and occupiers of property in Greenock, and Sir M. R. Shaw-Stewart, Bart.

London County Council (General Powers) Bill, from the Vestry of St. James's, Westminster, the Essex County Council, and the Kent Water Company, the New River and other Water Companies, the Kensington Vestry, the Lea Conservancy Board, the Thames Riparian Owners' Association, the Metropolitan and Westminster Electric Supply Companies, the Vestry of St. George's, Hanover Square, the Conservators of the Thames, the Corporation of London, the Commissioners of Sewers of the City of London, the Corporation of West Ham, and the Surrey County Council.

Plymouth Corporation Water Bill, from the Right Hon. Sir Massey Lopes, the Earl of Morley, Sir F. G. A. Fuller-Elliott-Drake, the East Stonehouse Local Board, and the Midland Roborough Highway Board.

South Staffordshire Water Bill, from the Corporations of Sutton Coldfield, West Bromwich, Walsall, and Wednesbury.

St. Helens Corporation Bill, from the Lancashire County Council.

West Hampshire Water Bill, from Colonel Cornwallis West.

A petition to restrict Water Companies was presented from the Hertfordshire County Council, and ordered to lie on the Table.

Sale and Hire of Gas-Stoves at Manchester.—The Manchester City Council last Wednesday resolved that in future no gas-stoves shall be sold by the Gas Committee, except to those customers who have them on hire, and then only at list prices.

MISCELLANEOUS NEWS.

THE BOARD OF TRADE REPORT ON THE GAS, &c., BILLS AND ORDERS OF THE PRESENT SESSION.

The Board of Trade report on the applications for Gas, Electric Lighting, and Water Bills and Provisional Orders for the present session has been issued. It shows that the number of Bills relating to the supply of gas is 15—of which 14 are for England and one is for Scotland. Five of these Bills contain provisions in regard to the supply of water, while one refers also to tramways. The capital proposed to be raised is £1,641,740—£880,000 by shares; and £767,740 by loans. There are 21 Bills relating to the supply of water; two of them being Scotch and two Irish. The total capital asked for is £2,839,066—£670,400 by shares, and £2,168,666 by loans. Provisional Orders to the number of 15 have been applied for in respect of gas and water, and 18 in regard to electric lighting schemes. The capital proposed to be raised under these Orders is: For gas supply, £296,271; for water, £153,750; for electric lighting, £756,350. Compared with last year, the number of Gas Bills has decreased by four; that of Water Bills by three—the total for the two classes of Bills being now 36, against 43 last year and 38 in 1891. The capital required for gas purposes is £842,990 more, and that for water purposes £5,804,084 less than last year. For Gas and Water Orders the capital proposed is £157,521 more; and for Electric Lighting Orders £454,753 less than last year. The applications for the last-named Orders show a further falling off—18 now, against 32 last year, 70 in 1891, and 161 in 1890. The report contains, as usual, an analysis of the Bills and Orders.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at the Bridge House Hotel, London Bridge—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) having read the notice convening the meeting, the report of the Directors and the statement of accounts, which have already appeared in the JOURNAL, were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, observed that the first paragraph of the report contained a word which had been absent from it for the last four years. "The Directors have, after an interval of four years, again the pleasure of submitting a satisfactory report." He wished the shareholders to understand, however, that the word "satisfactory" was used in the present report because, for the first time for four years, they had earned their dividend. For eight half years he had had to move at their meetings the adoption of reports in which the dividend had not been earned. In the past half year, it had been; and in that sense they considered it more satisfactory than the past eight half years had been. But he did not wish the shareholders to suppose that the Directors considered that the reports presented by them in the four years in question had been unsatisfactory. He was not at all sure, in fact, if the Company were of sufficient importance to have its history written, that some of these reports would not be regarded as the most satisfactory ever issued by the Directors. He said this deliberately; and, in dealing with the report of three years ago, after the memorable strike at their works, he desired to say nothing to bring up any ill-feeling, but he did believe that the report presented at the time in question was one of the most satisfactory that the Company had ever issued. He said this not in regard merely to the shareholders, but also to the country and to the workmen themselves. If he could not have felt that the action of the Directors at that time had been for the advantage of workmen as well as other classes, he would not have used the word "satisfactory" with respect to it. The next paragraph of the report dealt with the fact of the growth of the Company's business; and it stated that during the past half year there had been an increase of 5·8 per cent. in the quantity of gas sold over that in the corresponding half of the previous year. He thought they might take it that the two half years were about equal as to weather; there was nothing exceptional in either period. Those half years might, therefore, be very fairly compared; and this being so, the increase of nearly 6 per cent. was very satisfactory indeed. Perhaps he ought to state that, in the winter of 1891, they were hardly able to give a proper supply of gas to some of their customers. The Company had entered into a contract for the enlargement of the gasholder at Vauxhall; and unfortunately it was not finished to time. The result was that they were very short of storeage at those works; and some of the consumers did not receive the full supply of gas they wished. They had had, however, all they wanted in the past winter; and this might account for about 0·8 per cent. They might, therefore, take it that in the past half year, compared with the December half of 1891, there had been an increase in the quantity of gas sold of 5 per cent., which was very satisfactory. There was another point which he thought might also be regarded as satisfactory. Since they started purchasing land at Greenwich, they had been engaged in a stern chase, and had had great difficulty in overtaking their increasing business, and getting their works ahead of the demands made upon them. They were now, however, in the happy condition of having their works well in front of the demands. With, perhaps, some £25,000 or £30,000 more expenditure, they would have completed additional works at East Greenwich capable of supplying another 1000 million cubic feet of gas a year; and this would carry them on for two or three years, he supposed, without much further expenditure of capital. As to gasholders, they were, as the report stated, well in advance. They had recently completed a very large one. One reason why they built these large holders was that they could do so at much less cost per 1000 feet capacity than smaller ones. Their Company was the first to start these large holders about twelve years ago; and others were following their example. The result had been that, whereas the cost of gasholders some twenty years since came to about £20 per 1000 cubic feet capacity, it was now reduced, in the case of their last holder, to the low figure of £5 2s. 6d. One effect of this, however, was to give them an excess of storeage beyond what they required for the time. As the report stated, they had now storeage of about 130 per cent.; that was, taking their maximum day's make at a certain figure—100, for instance—their storeage was equal to 130, which would carry them on for some time. These extensions of plant accounted really for the increase in the capital account. A resolution would be submitted to the shareholders on that occasion authorizing the Directors to raise a further amount of capital to the extent of £250,000. Three years ago they had a similar resolution; and this money had all been expended, and expended on productive works. He might state at this point that, whereas twelve years ago the Company's capital per ton of coal used was over £5, they had since managed to reduce it by something like 10s., and now it stood at about £4 11s., notwithstanding that they had been buying land and building new works, which had necessitated the outlay of a large amount of money which was unproductive for the time. Whereas their original capital stood, as he had said, at the rate of £5 per ton of coal, they had obtained their increase of business by a rate of expenditure of from £3 to £3 5s. per ton—say, £3 10s. to be within the mark. He thought this would be satisfactory to the shareholders, because it showed that, although they were increasing their capital, it was not growing in the same ratio as was their business. For instance, £100,000 of capital cost the Company about £4500 a year, while it enabled them to earn some £15,000 a year profit; so that they were gaining on their original capital in this way—they were, in fact, reducing the amount required to pay interest on their capital. Twelve years ago it was 15d. per 1000 cubic feet on the gas sold; whereas now it was rather under 11d., although the price of gas was 6d. lower, and the dividend 1½ per cent. higher. The next point in the report referred to the Company's workmen; and he thought the shareholders would regard the statements made on this matter as very satisfactory. He remembered on one occasion, when there were great troubles in regard to the labour question, that he put it to the shareholders which should have the first consideration; and he did not forget that they said: "Give the workmen the first consideration." Dividing the question into three points—the workmen, the consumers, and the shareholders—the latter very generously said (and very rightly, he thought): "Consider the poor men first;" and the Directors had endeavoured to do this. The result had been, he thought he might say, that the Directors had gained the confidence of the workmen. This was shown by the fact that two years ago their employees had invested £1200 in the Company's stock, whereas at the date of the report the amount was £3662. It was a good deal more now, for since the report was written a number of workmen had brought their savings to the Directors; and only that day he had signed one or two transfers putting stock into their names. He thought the shareholders would regard this as a very good feature indeed. If workmen learned to trust their employers, it was one of the best signs of good will. The Board had also been entrusted by the men with more than £20,000 of their savings at 4 per cent. interest. This was certainly evidence of thrift on the part of their employees; and it was very much to their credit, while it was very much to the Directors' gratification. He might say a few words regarding the issue of new capital. Some time ago the Directors offered some "C" stock for sale by auction. They were not at all disposed to allow stockbrokers or stockjobbers to get any advantage out of the Company; and the Board therefore put the price at rather a high figure. The consequence was that only about one-third of the stock was sold; and the idea then occurred to them to offer the balance to their consumers. They accordingly sent out with the quarterly accounts a circular to each customer, announcing that the latter could have "C" stock in amounts of £5 nominal value and multiples of £5. The whole of the balance left was taken up by them. Last year, or in 1891, they repeated the process; and about £25,000 of stock was taken by the consumers. Last Christmas they had more to issue. It was submitted for tender first, and about £1200 was taken; but the balance of about £29,000 was offered to the consumers, who not only took the whole of it, but also applied for £11,000 more than the Company had to sell. When he told the shareholders that the amount thus taken meant about £70,000 in cash, it showed that the consumers in their district had confidence in the stability of the Company and of its business. He might also say that it must always be remembered that, although the stock carried nominally a dividend of 13 per cent., it only bore about 5 per cent. Under the auction clauses insisted upon by Parliament in 1876, compelling them to sell all stock at the market price, the interest paid to the investor was only about 5 or 5¼ per cent.; and the Company only paid this rate of interest for the capital used in the business. The proprietors might have seen by the newspapers that the Company were recently fined about £200; and the *Star* had placards all over London: "Livesey fined for bad gas." (Laughter.) One could afford to smile at such statements; but he might mention that their Solicitor, who purchased one of the placards, had stated that it was a distinct libel, because it was not Livesey who was fined, but the Company. The Board thought it due to the shareholders to give some explanation on this subject. The facts were very simple. The gas-testing provisions of the Acts were administered by gentlemen known as the Gas Referees. They were men of very high scientific attainments—in fact, they were such purists for pure science (or some of them were) that they had devised tests which were inconceivably exact. For instance, the Act said that the Company should supply gas that was free from sulphuretted hydrogen, which was a very noxious compound. Fortunately, there were means of removing it from the gas; but he should have thought that Acts of Parliament and everything else meant practically free. The Referees, however, read it literally; and they had devised a test for sulphuretted hydrogen which would detect one part of this compound in 100,000,000 parts of gas—that was, one millionth of 1 per cent. If this were expressed in decimals, it would be 0·000001 per cent. This was the test devised to ascertain whether or not there was any sulphuretted hydrogen in the gas; and if the gas did not pass this test, the Company were liable to a fine of £50. The Commercial Gas Company were fined last year for two days for excess of sulphuretted hydrogen. An infinitesimal amount, which was practically of no injury to anyone, brought that Company before the Police Court; and they were fined for it. He mentioned this to show the extreme exactness of these tests. He was once attending some of the lectures delivered

at the Royal Institution by Dr. Tyndall, who at the time was experimenting with glass. He (the Chairman), after the lecture, asked Dr. Tyndall whether glass was not the most perfectly elastic substance. Whereupon Dr. Tyndall said: "There is nothing perfect in Nature." The Gas Companies were, however, required to supply gas that was perfectly free from sulphuretted hydrogen; and if, by some small chance, it should have a taint of this compound, the Company were liable to be fined £50. With regard to the other sulphur compounds, gas could not be freed from them altogether; for there were some compounds of sulphur which it was absolutely impossible to remove from gas. In ordinary gas this would amount to about 35 grains in 100 cubic feet, or 1 part in about 700 by weight. The Act required them to reduce it to 17 grains in summer and 22 grains in winter; but it was an extremely ticklish and uncertain operation. There were no practical means of reducing these sulphur compounds, except by the use of lime, which had been previously rendered impure by the absorption of sulphuretted hydrogen from the gas. If the gas did not contain its usual quantity of sulphuretted hydrogen, they could not properly remove the sulphur compounds; and they therefore went up slightly in excess of the 17 grains. In consequence of the Durham strike last year, which cut off their usual supplies for three months, they had to get coal from all quarters—England, Scotland, Wales, and a little from Germany. This coal contained a varying quantity of other impurities, very little sulphuretted hydrogen, and an excess of carbonic acid; and the effect of using it was to upset their purifiers. They had had the greatest difficulty in getting their purifiers to work efficiently; and one of the consequences of this was that their purifying account was about £2500 more than it ought to have been in the past half year, because of the difficulties they had had to meet. However, they could not keep the sulphur down. The matter was referred to the Chief Gas Examiner, who could not say that this had been caused by any accident; and he decided that he would not allow the Company's appeal. They then addressed a letter to the London County Council, explaining the matter; and he believed he was right in drawing the inference from their reply that, if the matter had been left to the Council, they would have said that the Company had given a reasonable explanation. The Chief Gas Examiner had, however, decided that their appeal could not be allowed; and the Council therefore had no option but to send the matter for adjudication before the Police Magistrate. The Magistrate said that, although the Company had acted reasonably, the Chief Gas Examiner had decided against them; and he therefore imposed fines ranging from £4 to £10, and amounting altogether to £200. He (the Chairman) did not feel at all ashamed, but rather proud that they had been able to get through, in the way they had done, such difficulties as they had had to meet. The Chief Gas Examiner was a gentleman of very high scientific attainments also. But he knew nothing about gas manufacture; and a man of this sort, he (the speaker) contended, was not competent to be a Chief Gas Examiner. They had had some correspondence with him, and in one of the letters which he wrote to him (Mr. Livesey) he said: "I must try and find some very compact form in which the practical chemistry of purifying may be put." That letter was dated the 13th ult.; and on the 20th ult. he wrote and told the Chief Gas Examiner that the Magistrate had imposed the penalties in question. He added: "Under these circumstances, will you allow me to press you for an early fulfilment of your promise to give us some information on the question of sulphur purification, for to this day none of us know with certainty the cause or causes of the difficulty; neither do we know, nor has anyone been able to inform us, how to meet it should it again arise." That letter, as he had said, was dated the 20th ult.; and he had received no answer to it. His impression was that the Chief Gas Examiner found it much more difficult than he had expected to give them information on this practical question. There was one other matter bearing on this subject to which he desired to refer. The whole theory of the restrictions imposed upon the Gas Companies was that they were for the purpose of protecting the public. He had lately been very much struck in reading some evidence given by Sir Thomas Farrer before the Labour Commission on the 27th ult. Sir Thomas was speaking of public companies—such as railway, dock, canal, and other companies—which had to get parliamentary powers; and in the course of his evidence he said:

> There are many points in which the interests of these companies are at variance with those of the public; and the conditions which the State has imposed upon them for the purpose of preventing their monopoly from being injurious to the public are still tentative. These remedies have often proved inadequate, and *sometimes mischievous;* and whilst it is right and necessary to impose some restrictions on them, *yet, without great caution and wisdom, such restrictions are likely to be injurious to the public as well as to the companies.*

He (the Chairman) unhesitatingly said that the restrictions which were placed upon gas companies were injurious to the public. The penalties that were imposed did not affect the proprietors to the extent of a halfpenny. But they did affect the public; and he had very little doubt that he could prove that the absurd restrictions imposed on the London Companies caused the price of gas to be about 2d. per 1000 cubic feet more than it should be. Now, 2d. per 1000 cubic feet in London represented £250,000 a year. He protested against these restrictions, which were no gain to anyone, but which prevented the Company from selling gas as low as they were able to do. This brought him to the last point he had to mention—viz., the reduction in price of which the Directors had given notice. In the second paragraph of the report, they stated that, "encouraged by the very satisfactory increase of business, and with the prospect of obtaining coal at a reasonable price, the Directors take this, the earliest opportunity, of again acting in accordance with their fixed policy of selling gas at the lowest practicable price. They have, therefore, the pleasure to announce that, from Lady-day next, the price of gas will be reduced to 2s. 5d. per 1000 cubic feet." He found that this step had not met with the universal approval of the shareholders; and he had a letter in his hand from an influential proprietor who had written to protest against it. The gentleman in question spoke first of all of the amount of the reduction; and in the present half year, as the change would only run from March, it would only be about £5000. The writer also said that they only carried forward £5000 of undivided profit; and, after alluding to the increase in the capital, the necessity for building up a reserve fund, and the possibility of a rise in the price of coal or of a strike, he said: "There is nothing to gain from this reduction." On this point, however, the Directors joined issue with the proprietor. The matter was very seriously considered by the Board from all sides; and they came to the conclusion that it was the right and proper thing to do. The step was not by any means hastily decided upon; and there was something to gain from it. There was no doubt whatever that a low price of gas tended to an increase of business. Comparing their business with that of other gas companies, they found that, while others had had a decrease, or a very trifling increase, their Company had had an increase of 5 per cent. in the past half year. Taking the great Company on the North of London, he found that in the last five years their total increase of business had been 15 per cent.; while, in the case of the South Metropolitan Company, it had been 25 per cent. in the same period. He thought the Directors were entitled to say that a part of this, and a considerable part, was due to the liberal policy with which they had treated their consumers—to the low price and other means they had adopted to make their consumers satisfied with what the Directors were doing. It was said that there was no demand for the reduction; but that was all the better. When a reduction was expected, there was not much effect in making it—it was, in fact, discounted; but when no one expected it, the concession had more weight. Then it was said that the amount of the reduction was only to be 1d. per 1000 cubic feet. That was so; but they must go now by reductions of 1d. But this meant £28,000 a year to the consumers. They wished the public to see that it was their desire to sell gas at the lowest practicable price. If, therefore, they had not reduced it by 1d., where would be the honesty of their professions? Moreover, the step taken by them gave the public the assurance that the Company would reduce their price whenever they were able. They did so by 1d. per 1000 cubic feet this quarter. He hoped there would be a similar reduction before long; and he trusted that the day would come when they could sell their gas at 2s. per 1000 cubic feet. One objection which had been urged was that, if the price was raised, they would have a good deal of opposition, as had been experienced in the case of the new railway rates; but they did not anticipate having to raise the price. Three years ago they were selling gas at 2s. 3d. per 1000 cubic feet; and they now saw their way to getting coal at very nearly the same price as before the rise took place—very nearly the same price which ruled in 1888. That being so, they regarded it as their duty to give to the consumers the advantage they saw within reach. They had repeatedly said that the consumers and the Company were "in the same boat"—in fact, partners. Parliament had regarded the consumers on the one side, and the gas companies on the other, as antagonistic; but since the introduction of the sliding scale, their interests had been made identical. It was not the interest of the Company to do anything to the disadvantage of the consumers, but to do everything to their advantage; and this would also benefit the Company. Those who objected to the action of the Directors also said the reduction might lead to a decrease in the dividend or an increase in the price. He therefore desired to say that, as far as the Board could see, there was no immediate prospect of either. They did not see any prospect whatever of an increase of price at any early period; nor did they think there was any early probability of a diminution in the dividend. This being so, he felt that the Board were justified in what they had done; and he must ask the shareholders who did not agree with him to wait. The matter could not be altered now, for notices had been given that the reduction would be made. Their friends must therefore wait until the next half-yearly report to see what story the Directors might have to tell them.

Captain T. B. HEATHORN, R.A., seconded the motion.

Sir RICHARD WYATT held that, while the Directors were cultivating the good opinion of the public, the interests of the shareholders must not be lost sight of. He therefore took it for granted that the Board had very carefully considered whether there was any possibility of another strike, or any other circumstance which might imperil the interests of the shareholders. In his humble opinion, he thought that it would be wise to have what was familiarly called "a horse in the stable," and that they should not cut their garment too closely. It occurred to him that the balance which was proposed to be carried forward was scarcely sufficient to meet every possible contingency. He might be wrong; but, as a shareholder, he said: Do not jeopardize our interests in trying to cultivate the good opinion of the public.

Mr. R. FOSTER said that he had read the Directors' report very carefully; and two or three things had struck him very much. One was the investment by the employees in the Company's stock, which now amounted to £3662, irrespective of the £20,000 which had been deposited by their workpeople at interest. He thought that this was an answer to what the last speaker had said, and that the employees and the Directors were working thoroughly well together. He therefore did not believe there was any occasion for the shareholders to anticipate a disaster such as that which occurred three years ago. He had heard the Chairman on former occasions say that the Directors considered the three interests—the workmen (who were put first), the consumers, and the shareholders; and, from all he had seen during the past troublous years, he thought that the Board had succeeded perfectly well in pleasing all. Let them, therefore, go on as they had been doing. He was very glad indeed to see that the Directors were able to lower the price to 2s. 5d., which he hoped would be further reduced soon.

Mrs. OLIVER stated that, on account of the cheapness of paraffin, she only used two gas-lights in her house. She lived in the North of London, where the price of gas was above 3s. per 1000 cubic feet. When the collector called for the account, she asked him when the price would be lowered; because when it was, they would burn more gas, and have a gas-stove. When it was at a high price, small people could not afford to burn so much.

The CHAIRMAN, in reply, said he thought that Mr. Foster had answered Sir Richard Wyatt. With regard to the question of a strike, they might be in a Fool's Paradise (although he did not think they were); but they had not the remotest fear of another strike. Their own workmen were on good terms with them; and only last week there was

a meeting of their Profit-Sharing Committee, which was as pleasant and cordial a gathering as anyone could have desired. Their own workmen took a fair view of everything; and as regarded the poor fellows who struck, since the strike numbers of them had told him that the Company would "never have another strike, and that the one which they had all had to regret would never have occurred if the men had known how it would have been met." There was the possibility of a coal strike; but they were keeping up their stock, and they got through the Durham strike last year at a loss of only about £10,000. He thought that the Durham men had had enough of it, with three months out of work; and that they would be rather chary of striking again. The Board did not regard this matter with any apprehension. They had had all these points under consideration; and in looking at the current half year, an estimate was made, and they came to the conclusion that they would have a fair balance at the end of the six months, after making the reduction. He was very much obliged to their lady shareholder for her remarks. About 20 years ago, oil cost almost as many shillings a gallon as it now cost pence; and it was a very formidable competitor with gas. There was no question that a reduction in the price of gas would tend to increase consumption, and give stability to the Company. He hoped that Sir Richard Wyatt was satisfied. They had fully considered the matter, and had thought it the right, and a safe course to take; and six months hence the proprietors would have the opportunity of being able to tell the Directors whether they had done right or wrong.

The resolution was then carried unanimously.

The DEPUTY-CHAIRMAN (Mr. John Mews) proposed that a dividend at the rate of 13 per cent. per annum be declared; and that such dividend, with the exception of the sum of £500, be apportioned among the three classes of stock, as prescribed by the Scheme of Amalgamation.

Mr. E. H. CARDWELL seconded the motion.

The CHAIRMAN observed that the dividend was the same as before; and they had no fear that it would not be maintained.

The resolution was adopted.

The DEPUTY-CHAIRMAN then proposed, and Mr. BUTLER seconded, the re-election of Mr. George Livesey to his seat at the Board—both gentlemen warmly referring to the eminent services the Chairman had rendered to the Company, and to the high qualifications of Mr. Livesey for his position. Incidentally reference was made by Mr. Butler to the prominent part taken by the Chairman in connection with the serious strike of three years ago, and to the great services which Mr. Livesey then rendered, not only to the Company, but also to the country.

The resolution was carried unanimously.

The CHAIRMAN, in acknowledging his re-appointment, assured them that the kindness which had been shown to him would weigh with him very greatly in his feelings towards them. He afterwards proposed the re-election of Mr. Robert Morton, who, he reminded them, had been, like himself, the manager of gas-works, and who made a most admirable Director.

Mr. SARGENT seconded the motion, which was agreed to.

The retiring Auditor (Mr. A. Footner) was afterwards re-elected.

The CHAIRMAN then proposed the following resolution: "That the Directors be and are hereby authorized to raise the sum of £250,000 further capital, by the issue of new ordinary 'C' stock and debenture stock, in such amounts, at such times, and in such manner as they may deem desirable, pursuant to the powers contained in the Company's Acts of 1876 and 1882." He assured the shareholders the Directors would be most careful in the raising, and economical in the spending, of capital; and they would endeavour in the future, as they had done in the past, to take care that whatever capital was raised should be judiciously expended.

Mr. MORTON seconded the motion, which was unanimously adopted.

A vote of thanks to the Chairman and Directors was next accorded,

The CHAIRMAN, in reply, assured the shareholders that the Directors heartily appreciated the vote of confidence which they had passed. He afterwards observed that two or three years ago, at the instigation of the shareholders, a testimonial was subscribed for him. He felt grave doubts at the time whether, in connection with such a matter as the dealing with a strike—seeing that he was only one of the Board—he ought to accept any public acknowledgment; but, owing to the kindness with which the matter was urged, he felt that he could not resist. There was, however, one point upon which his mind had been made up, and that was that he would not accept the money raised. The difficulty had been to know what to do with it. He had set his heart on an open piece of land at New Cross, near the Old Kent Road, as a recreation ground; and the testimonial gave him the opportunity of negotiating with the Haberdashers' Company for about ten acres. At first £8000 was asked, which was afterwards reduced to £6000. The money raised for him was between £1700 and £1800; and it was now lying at the London Joint-Stock Bank in the names of Mr. Foster and himself. He made a proposal to the Deptford parish that, if they would contribute £2000, and if the London County Council would give another £2000, the balance could be made up, and the land purchased. He was now happy to say that, after considerable delay, the matter was settled. If the County Council had not at present possession of the land, it was practically in their hands. They had undertaken to lay it out; and he believed that the result would be the provision of a very pleasant recreation ground for the people of the neighbourhood for ever. With reference to the London County Council, he desired to state that that body had always dealt fairly with the Company, and that in this matter they had acted very liberally. He again thanked the subscribers to the testimonial for their kindness towards him. He afterwards proposed a vote of thanks to the officers and staff; and said he was very much obliged to Mr. Foster for thinking that it was not sufficient to mention only the officers and staff, but that they should also recognize the good will and hearty services of their workmen, as well as of their officers, in promoting the interests of the Company.

Mr. FOSTER seconded the motion, which was unanimously adopted.

The CHIEF ENGINEER (Mr. Frank Livesey), in returning thanks, assured the shareholders that the officials worked hard to maintain and to increase the well-being of the Company. It afforded him the greatest pleasure to go round the works, for the way in which they were received by the employees was most pleasant.

The SECRETARY also returned thanks; and the proceedings closed.

BRENTFORD GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. H. C. WARD in the chair.

The SECRETARY (Mr. W. Croxford) read the notice convening the meeting; and it was agreed to take as read the Directors' report and the statement of accounts, the principal features of which were referred to in last week's issue.

The CHAIRMAN, in moving the adoption of the report and accounts, said he was sorry to say the Directors met the shareholders for the first time for a long period with a reduction in the dividend; and they would naturally wish to know why this was so. The reason was that they had been obliged to raise the price of gas; and, consequently, under the sliding scale, there would have to be a diminution in the dividend. All who had had anything to do with gas-works during the past two or three years, must have been painfully aware of certain matters that affected in a degree their normal prosperity. There was the rise in the price of coal—which was a bit of a legacy from the Durham miners' strike—the fall in the value of the residual products, and the increase (if he might say so) individually of the price of labour, which, in itself, would go a long way to justify and to shadow forth the necessity of an advance in the price of gas. And when he informed the shareholders that during the past two years or so, they had been altering the system of horizontal retorts to inclined retorts, and charging the whole expense against revenue, they would see that there was a greater additional reason for the accounts not being quite so good as hitherto. They had now converted one-third of their retort system; so that, until they proceeded with the change, there would be no further expenditure in this respect. Of course, the old retort-settings were charged to capital; so that, when they took them down and replaced them by inclined retorts, the latter had to be charged against revenue. The result of this had been that, during the three half years ending Midsummer, 1892, they had, in order to make up the statutory dividends, taken from the undivided profits between £25,000 and £26,000. Having done this, and having had warning as to the prospects of the coal market, and knowing the condition of the residuals market, the Directors determined to raise the price of gas 3d. per 1000 cubic feet. Looking over the accounts, he found that the coal carbonized in the past half year had cost no less than 20d. per ton more than in the corresponding period of 1891; and supposing the production of gas to be 10,000 cubic feet per ton, this represented 2d. per 1000 cubic feet. As a matter of fact, they did make 10,000 cubic feet of gas per ton of coal; but they did not sell that quantity. During the same period, the receipts for their residual products had decreased by 9d. or 10d. per ton of coal carbonized, which was equivalent to 1d. per 1000 cubic feet of gas. Therefore, the 2d. increase in the cost of coal and the 1d. reduction in the value of the residuals, made the 3d. advance which the Directors had thought it their duty to make. This was sufficient to show that the Directors had only acted as prudent men in the step they had taken. He need not say how disagreeable it was for any Board of Directors to have to raise the price of gas; it being their desire to supply the public with the best article, at the cheapest and lowest figure possible. This had always been the aim of the Directors and officials of that Company; and there was another reason why they should do so. By the wisdom of those who introduced the sliding-scale, they could not put the whole burden upon the consumers, but the shareholders had to bear a part of it—in other words, for every 1d. increase made in the price of gas, they had to make a reduction of ¼ per cent. in the dividend. Consequently, having raised the price 3d. during a portion of the past half year, the Directors were obliged to lower the dividend by ¾ per cent. He believed, however, that the increase would be of short duration. Dealing next with the accounts, he said that the progress of the business was most satisfactory. It went on with a regular run of 4 or 5 per cent. per annum; and, during the last six months, it had been rather more than 4 per cent. There was one remarkable matter which he wished to bring to the notice of the shareholders; and he thought it justified them in the course they had taken—and boldly taken—in changing from the system of horizontal to inclined retorts so far as they had done. He might mention, in the first place, that the inclined retorts were much more easily charged than the horizontal ones; and the men who had to do the work were not so liable to throw down their tools and strike at any moment, and leave the public and the Company at the mercy of those who misled the men. As a matter of fact, the system was also cheaper to work; and nothing would show this so clearly as the accounts now before them. They would see that the quantity of coal carbonized in the past half year was 60,179 tons, as against 58,046 tons in the corresponding period of 1891. Turning to the revenue account, it would be found that the carbonizing wages for the past half year had been £10,769, as compared with £12,483; so that, although they had carbonized an additional 2100 tons of coal, it had cost them in wages £1700 less. This was indeed a most pleasing thing to contemplate, because it showed they had been going on in the right direction. It was only fair that he should say the whole credit for this—of course, the Directors had to give their sanction—was due to their Engineer (Mr. Frank Morris). The result of the working in the past six months was a profit of £33,382, as against £28,756 in the December half of 1891. This would enable them to pay the interest on the debenture bonds and pay the dividend (with the exception of £607), and to carry forward the sum of £17,054. Altogether, he considered this was a very satisfactory statement. Had they raised the price of gas 3d. at Midsummer, instead of Michaelmas, they would not have had a deficit at all, but would have had something to add to what he might call their "nest-egg." Before concluding, he ought to express the great regret of the Directors at the absence of one of their most able colleagues, Mr. J. Orwell Phillips, the Secretary of The Gaslight and Coke Company, who had been extremely ill. He had an interview with him on the previous day; and he was very anxious about the affairs of the Company, as he was about those of the Chartered Company. He was a great deal better; and he (the Chairman) hoped he would be present at their next meeting.

Sir R. H. WYATT seconded the motion.

Mr. HUGHES said he noticed they were charging for gas 3s. 3d. per 1000 cubic feet; while a large Company on the other side of the water only charged 2s. 5d.

The CHAIRMAN replied that the Company referred to were very differently situated. Their capital was much smaller per ton of coal carbonized, and always had been, than any other Metropolitan or Suburban Company. A Metropolitan Company proper must have a smaller capital per ton upon which to pay dividend than a Company like theirs, with mains running along green lanes for long distances. Besides, the South Metropolitan Company had only to carry their coal to East Greenwich, or perhaps a little farther to the Old Kent Road. The cost of their coal was, therefore, considerably less than it would be if they had to convey it up the river, and then put it into barges to take it to Brentford, or up the canal to Southall. This made a great difference in the cost of the coal before it reached the retorts. Then, again, the South Metropolitan Company were in a wonderfully favourable position for the sale of their coke. Theirs was a coke-consuming district; so that they could deal in fuel of that class better than the Companies on the north side of the Thames. Replying to an inquiry by Mr. Montagu, the Chairman said they were hoping to get some relief with regard to the cost of coal during the next half year. Only that day he had been considering the matter; and he was happy to find the price would come down more than he had expected, He also saw a little gleam of sunshine in the value of the residual products. Mr. Morris had informed him that there was a rise in the offer for sulphate of ammonia; and if they could get a little more for coke, they would be in the happy condition of being able to reduce the price of gas and raise the dividend again, and the more speedily they could do it, the better they would be pleased.

The motion was unanimously carried.

Dividends were declared at the rates of 5 per cent. per annum on the 5 per cent. preference stock, 11½ per cent. on the consolidated stock, and 8½ per cent. on the new 1881 stock; and subsequently resolutions were passed re-electing the retiring Directors (Sir R. H. Wyatt and Mr. E. Walmisley) and the Auditors (Mr. J. W. Field and Mr. M. F. Monier-Williams).

The services of the Directors were suitably acknowledged; and the proceedings then terminated.

EAST LONDON WATER-WORKS COMPANY.

A Special General Meeting of this Company was held on Monday last week, at the Offices, St. Helen's Place, E.C.—Mr. G. BANBURY in the chair—for the purpose of considering the Bill promoted by the Company to obtain authority for the creation of debenture stock, the construction of new works, and other purposes.

The SECRETARY (Mr. I. A. Crookenden) read the notice convening the meeting.

The CHAIRMAN said the meeting had been called in order that the proprietors might, if they thought proper, signify their approval of the East London Water-Works Company's Bill. The principal feature of the measure was the provision authorizing the Company to raise money for the development of their business and the extension of their mains. The Solicitor would presently go through the various clauses; and if the proprietors wished for any technical explanations, he would give them. There appeared to be some slight misunderstanding in regard to the wording of the clause which provided that the water-fittings should be tested and stamped. That they should be so treated was very desirable, not only for the health and comfort of tenants, but also to check any waste. The misapprehension which had arisen was that it seemed to be thought that existing fittings were to be tested and stamped; but nothing of the kind was intended. There was no wish that the clause should be retrospective, or that there should be anything like *ex post facto* legislation; and the wording would be rendered perfectly explicit on this point. The clauses now under consideration were almost word for word the same as those adopted by the Corporation of Manchester, where the testing and stamping of fittings had been attended with most advantageous results. The only difference between their scheme and that of the Manchester Corporation was that theirs was a little cheaper.

The SOLICITOR (Mr. Bonnor-Maurice) said the Bill consisted of 20 clauses, the first six of which dealt entirely with the raising of money. These clauses authorized the Company to issue £500,000 of 4 per cent. debenture stock, free of income-tax. Clauses 7 to 13 enabled the Company to lay down a short line of railway crossing a footpath, for the purpose of connecting the Great Eastern line with their works. This could not be undertaken without statutory powers; and hence the clauses. By clause 14 the Company would obtain the right to acquire Lammas and other rights over land they had bought—of course, paying proper compensation. Clause 15 related to the filling up of casual vacancies on the Board. As the law now stood, so far as their Company was concerned, it was necessary to call a general meeting of the proprietors to fill up a casual vacancy. It was now proposed to adopt, from the Companies' Act of 1845, a clause which found a place in nearly all undertakings of a similar character to their own. Clause 16 was for the purpose of imposing a penalty upon people who interfered with the Company's mains. Clause 17 dealt with a matter to which the Chairman had referred. It was for the purpose of enabling the Company to be rather stricter with regard to the fittings, in order to prevent waste of water. As the proprietors had already been told, the clause was not to be retrospective. By clause 18 certain obsolete provisions in their Act of 1853, with reference to an old main which was laid in that year, and taken up long ago, were repealed. The next clause was the ordinary one, providing that nothing was to alter the General Acts relating to the Company; and the last clause dealt with the expenses of the Act. These were all the clauses of the Bill to which the general assent of the proprietors was required, in order to enable the Board to comply with the Standing Orders of Parliament. The Bill had been read the first time, and would probably be read a second time on the 20th inst.

Mr. W. S. CUFF inquired whether the new debenture stock would rank with the present stock. He expressed the hope that the Board would obtain control over the fittings; but that, when they got it, they would not press it too far.

The CHAIRMAN, in reply, said the new debenture stock would rank *pari passu* with that already existing. With regard to the fittings, the proprietors might be sure the Directors would not do anything that would be in the least likely to "put up the backs" of their customers. They might also depend upon their Engineer (Mr. Bryan) bearing the sanitary aspects of the question well in mind. He then moved a resolution formally approving of the Bill.

Mr. H. DALTON seconded the motion, and it was carried.

The proceedings then terminated.

CROYDON COMMERCIAL GAS COMPANY.

Directors' Report and Statement of Accounts.

The shareholders of this Company will hold their half-yearly meeting to-morrow. The report which will be submitted by the Directors announces an increase of 6·13 per cent. in the quantity of gas sold, as compared with the corresponding period of 1891, which to some extent is attributable to the additional day consumption for heating and cooking stoves and to the continued growth of the weekly prepayment system. The revenue derived from residual products is considerably less; the low price obtained for tar being the principal cause of the reduction. As to the improvements at the works, the new retort-house and coal-stores are nearly completed. One set of purifiers has been enlarged; and the work connected with the second set will shortly be commenced. Contracts have been entered into for the extension of the Company's high-level railway and for the supply of ten through settings of retorts on the regenerative principle. Since the last meeting, the Directors have sold by tender, 500 new ordinary shares of £10 each, which realized £11,135, or an average of £22 5s. 5d. per share. Additional capital will shortly be required; and the Directors will therefore at an early date invite tenders for 500 ordinary £10 shares, and for £5250 of 4 per cent. mortgage debentures. With regard to the dividend, the unappropriated balance amounts to £18,106, out of which the Directors recommend payments at the rate of 14 per cent. per annum on the capital of £51,600, 11 per cent. on the capital of £142,500, both for the half year, and 11 per cent. on the new capital of £5000 for two months, all less income-tax. These dividends will amount to £11,541, and will leave a balance of £6565 to be carried forward. As to the accounts, the capital expended in the six months has been £7613, leaving a balance of £5689. The revenue amounted to £44,081, made up as follows: By sale of gas (at 2s. 10d. per 1000 cubic feet), £32,989; rent of meters, stoves, and fittings, £1393; residual products, £9633; and cottage rents, £66. The total expenditure was £33,330, of which £26,571 was required in the manufacture of gas; £2503 in its distribution; £611 for the lighting and repairing of public lamps; £1444 for rents, rates, and taxes; £1528 for management; and sundry items absorbed £671. The balance of profit was, therefore, £10,751. Respecting the manufacturing operations, the quantity of coal carbonized in the half year was 22,841 tons, of which only 48 tons was cannel, and from which 240,086,000 cubic feet of gas had been produced. The residuals made were (estimated): Coke, 274,092 cwt.; breeze, 48,049 cwt.; tar, 209,662 gallons; ammoniacal liquor, 639,733 gallons; and sulphate of ammonia, 196 tons.

BROMLEY GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report of the Directors of this Company for the half year ending Dec. 31, 1892, which will be presented at the ordinary meeting of shareholders on the 27th inst., it is stated that the sale of gas, as compared with the corresponding period of 1891, shows the very satisfactory increase of more than 6¾ million cubic feet, or about 8½ per cent. As anticipated in the last report, the profit and loss account shows a more favourable balance—viz., £5506—which is more than sufficient to maintain the dividends paid during the last year. The Directors accordingly recommend the declaration of dividends at the rate of 11½ per cent. per annum on the ordinary 10 per cent. shares; and of 8½ per cent. per annum on the ordinary 7 per cent. shares—amounting together to £5234; and that the balance of £272 be carried forward. Owing to the very rapid and continuous increase of the consumption of gas in the Company's district, it has now become absolutely necessary to make a large outlay in extending the manufacturing capacity of the works. On several days during the past Christmas season the existing plant was taxed to its utmost extent; the output having been more than a million cubic feet in 24 hours. To give some idea of the growth of the business, it may be stated that since 1882 the make of gas has been almost exactly doubled. It now amounts annually to 175 millions; and in another ten years will probably approach 300 millions. The Directors purpose, during the present year, erecting a new retort-house and purifying-house of sufficient capacity ultimately to provide for the manufacture and purification of 300 million cubic feet of gas per annum; but it is only intended to fit up in these new buildings plant sufficient, from time to time as the necessity arises, to meet the increasing requirements of the Company. The estimated expenditure for these and other enlargements that are necessary during the current year is about £20,000; and the Directors propose to raise this sum, under the authority already given to them, by offering for sale during the summer new shares sufficient to realize £15,000, and by borrowing £5000 on debentures in the autumn. The expenditure on capital account during the past half year has been chiefly in respect of the new meter-house, and the pipes, valves, and connections belonging to it; for a large new boiler; and for several extensions of the mains. Out of £144,328 of capital raised, a total of £139,441 has been expended. The accounts accompanying the report show that the receipts in the half year amounted to £18,164; and the expenses, to £12,189—leaving a balance of £5975 to go to the profit and loss account. The working statements show that 9291 tons of coal were carbonized, and that the make of gas was 91,707,000 cubic feet; the residuals produced being 9291 chaldrons of coke, 843 chaldrons of breeze, 92,910 gallons of tar, and 61 tons 11 cwt. of sulphate of ammonia.

PROVINCIAL GAS AND WATER COMPANIES.

From the reports and accounts of Provincial Gas and Water Companies which have reached us during the past week, we have extracted the particulars contained in the following paragraphs.

Gas Companies.

The shareholders of the Bath Gas Company will hold their half-yearly meeting next Friday. The accounts to be presented show a balance of £7706 on the working of the undertaking in the half year ending Dec. 31 last. The gas-rental amounted to £26,398, which was an increase, as compared with the corresponding period of the year 1891. In their report the Directors state that there was a considerable decrease in the manufacturing expenses in the half year; and that the result of the working of the second series of stoking machinery is satisfactory. The quantity of coal carbonized was 20,908 tons; the residual products being: Coke, 13,571 tons; breeze, 1000 tons; tar, 983 tons; ammoniacal liquor, 603,000 gallons. The balance of net profit to be carried to the next account, subject to the past half-year's dividends, is £9909. The Directors recommend the declaration of these at the maximum rates.

During the past year the Bromsgrove Gas Company have sustained serious loss by leakage of gas from mains fractured in the breaking up of the streets for sewerage and other purposes. Had this not occurred, there is no doubt the year would have been a prosperous one, for the earnings were nearly equal to those of 1891. However, the accounts show an available balance of £916, from which a dividend at the rate of 5 per cent. has been declared.

At the recent half-yearly meeting of the Bury St. Edmunds Gas Company, the report submitted by the Directors stated that the high price of coal and the reduced value of residuals were still a source of difficulty; but they were in the position to recommend the payment of a dividend for the past half year (free of income-tax) of 11s. 6d. per share on the 1849 capital, 9s. per share on the 1859 capital, and 8s. 6d. per share on the 1879 capital. Feeling allusion was made to the death of Mr. W. Salmon, who had very many years been associated with the Company. He had ably carried out the duties of Chairman of the Board after having fulfilled very satisfactorily the secretarial duties. The report was adopted.

The Directors of the Canterbury Gas and Water Company will report, at the annual meeting of the shareholders on the 27th inst., that the consumption of gas continues to steadily increase, and that, in order to provide additional carbonizing plant, as well as better storeage for coals during the winter, certain alterations (which can be carried out at a moderate cost) are now under their consideration. During the past year, the Dean and Chapter of Canterbury ceased to manufacture gas at their private works; and an agreement has been entered into whereby the Cathedral, together with the houses and premises in the Precincts, are all now supplied by the Company. Regarding the works connected with the water supply which the Company undertook to carry out when applying for their Act in 1899, these have been successfully completed by laying down a duplicate pumping-main to the St. Thomas's Hill reservoir. This work, with that previously executed at the pumping-station, involved a considerable outlay; and the expenditure has been met by the issue of loan capital to the extent of £5000. Respecting the accounts, the amount available for division, after providing for the interest on the mortgage loans, is £5099; and the Directors recommend that a uniform dividend at the rate of 4 per cent. be declared on the gas and water stocks, making, with the interim dividend, 8 per cent. for the year.

According to the report presented to the shareholders of the Chesterfield Water and Gas Company at their half-yearly general meeting last Friday, the net profit was £3778. The amount available for division was £5954. Out of this the payment of dividends of £2 10s. and £3 per cent. on the various stocks and shares, amounting to £4448, was proposed.

The Chairman of the Newport, Mon., Gas Company (Mr. E. J. Phillips) was able to congratulate the shareholders, at their meeting on Monday last week, upon the position of the concern. He said that, in order to pay the usual dividends, they had to draw upon the reserve fund to the extent of £851; but, on this occasion, they had to pay interest on an additional £12,000 capital raised during the past half year. There had been a considerable reduction in the price of coal; and they had 2000 tons more in stock at the close of the year than in December, 1891. In the consumption of gas, there had been an increase of 6¾ per cent.; and, taking all things into consideration, it was hoped that, at the end of the current six months, they would have to take a much smaller sum from the reserve fund than on this occasion—indeed, he hoped that, in the course of twelve months, they would be able to pay the dividends without having recourse to their reserves. The contract for a new gasholder at Crindall (the capacity of which would be a million cubic feet) had been let; and, when completed, the Company would have sufficient storeage accommodation for several years. The report was adopted; and the maximum dividends were declared.

The half-yearly general meeting of the Poole Gas Company was held on Monday last week—Mr. H. Farmer in the chair. The Secretary and Manager (Mr. W. Davis) read the Directors' report, which stated that in the six months ending Dec. 31 last there had been a profit of £1209, as compared with £1101 in the corresponding period of 1891. The balance available for division allowed of the payment of the maximum dividends (less income-tax) upon the whole of the stocks and shares; and this the Directors recommended. In order to provide the additional carbonizing plant required for next winter's supply, a new retort-house would have to be proceeded with. Further capital for the general extension of the works was required; and the Directors had invited applications for 200 of the "C" preference shares of £10 each. The Chairman, in moving the adoption of the report, congratulated the shareholders on the recommendation of the Directors to pay the maximum dividends, which they had not been able to do on the "A" stock since the first half of the year 1886. The consumption of gas during the past half year was the largest they had had since the formation of the Company. The motion was carried; and the dividends recommended were declared.

In the opening paragraph of the annual report of the Directors of the Preston Gas Company, reference is made as follows to the recent advance in the price charged to consumers: "During the past year, your Directors found it necessary to increase the price of gas, which took effect on the 1st of October last. The reasons for the increase were given in the special report of the Engineer, which largely allayed the feeling of dissatisfaction, though they regret to say that a considerable number of small consumers had their supply of gas discontinued. A few of these are returning; and it is hoped that, as it is found that many of the statements made at the time were both exaggerated and erroneous, the bulk will again become consumers. Notwithstanding this, as well as the extension of the electric light, and the depressed state of trade, the yearly accounts are fairly satisfactory; for though the consumption of gas shows a decrease as compared with the year 1891, it is still in excess of that of 1890." Proceeding, the report states that the reduced prices obtained for tar and sulphate of ammonia have affected the income; but, on the other hand, the Directors are able to report more favourable contracts for cannel and coal. They recommend that the usual dividends after the rate of 10 per cent. on stock "A" and 7 per cent on stock "B" be declared. Though the balance of profits for the year does not enable them to pay this without having recourse to the reserve fund (from which £4758 is withdrawn), the deficit arises from the first half-year's working; the profits for the last half of the year being sufficient to meet all claims. The sum of £5041 still stands to the credit of that fund. The Directors also refer with regret to the death of Mr. Adam Leigh, a colleague who for many years took a deep interest in the welfare of the Company. Mr. John Leigh (who is a large stockholder) has consented to be put in nomination to succeed his father.

Water Companies.

The half-yearly meeting of the Chester Water Company was held last Thursday week. The Directors report stated that the surplus revenue over the expenditure of the last six months was £2556, which, adding the balance from the previous half year (£4294), made a total of £6849. Deducting the interest on preference capital (£450), this left a balance of £6399, which it was recommended should be appropriated to the payment of a dividend at the rate of 7½ per cent. per annum (free of income-tax) upon the consolidated stock, and 7 per cent. per annum upon the new ordinary stock, amounting to £1890, and carrying forward the sum of £4509. The Chairman (Mr. W. Brown, J.P.), in moving the adoption of the report, referred to the agitation respecting the quality of the Company's supply. The Directors, he said, were taking considerable pains to ascertain what would be the best for the future, and had thought it desirable to go to some expense in experimentally treating the water in various ways. They had had an analysis of the water made; and it compared very favourably with the Vyrnwy supply. The report was adopted.

The ordinary meeting of the shareholders of the Colne Valley Water Company was held last Tuesday, at the Charing Cross Hotel. The Chairman (Mr. J. R. Holland), in submitting for adoption the report of the Directors and the accounts (see *ante*, p. 231), stated that the water-rates and meter-rents for the whole of the past year had amounted to £12,863, while for 1891 they were £12,055—being an increase of £808. At the last meeting, he informed the shareholders that the average annual increase for the past ten years had been £640; so that last year was £168 above the average. This result had been partly due to having fewer unoccupied houses in the district. The empty premises seemed to have reached the culminating point in 1891; and he believed there would be a settled decline in the ensuing years. Referring to the saving which had been effected in fuel by the new engines, he said that the total cost in 1890 was £1562; in 1891, £1047; and in 1892, £703—being a reduction in the expenditure for fuel of £859 compared with 1890, when the old engines were working. There had been an increase in the item of general working expenses and repairs, owing mainly to some extensive repairs which had been made at the works. The total profits for 1892 were £7576, as compared with £7101 in the preceding year, notwithstanding the payment of £475 to the Directors in fees. The total quantity of water pumped was 161 million gallons; there having been an increase of 4 million gallons during the half year. This represented a supply for domestic purposes of 21 gallons per head per day. The Directors recommended an increased dividend at the rate of 3½ per cent. per annum. It was probably owing to this proposal that they had seen a rise in the price of their shares on the Stock Exchange. The debenture stock had gained 3; and was now quoted at 105-110. The ordinary shares had increased ½, and were quoted at 10½-11½. In the course of some subsequent remarks, the Chairman gave the percentages of maintenance to gross income since 1886. In that year it was 31·34; in 1887, 35·41; in 1888, 35·55; in 1889, 37·38; in 1890, 36·32; and 1891, 31·84; and in 1892, 25·78. The average of the London Water Companies was 29·27; so that he thought the Colne Valley Company stood in a very good position. The report was adopted; and the retiring Directors and Auditor were re-elected.

According to some figures given by the Chairman of the Truro Water Company (Mr. J. C. Daubuz) at the meeting of the shareholders yesterday week, the concern has made steady progress since 1888. In that year the revenue amounted to the sum of £1452; in 1889, it was £1536; in 1890, £1558; in 1891, £1695; and in 1892, £1803. Contrary to general experience, the expenditure in the same period has slightly diminished; it being £1100 in 1888, and £1062 in 1892. The profit last year was £806, or rather more than 5 per cent. on the capital employed; and from this a dividend of 2½ per cent. was declared.

Sale of Shares.—Messrs. Hooker and Webb recently sold at Croydon 13 £5 shares in the *Croydon Gas Company* (bearing a dividend of 14 per cent.) for £14 5s. each; and 30 £5 shares (earning 11 per cent.) for £11 5s. apiece.

The Purchase of the Mexbro' Water-Works by the Local Board.—It was announced at last Wednesday's meeting of the Mexbro' Local Board that an agreement had been entered into for the purchase of the local water-works for £10,000, subject to the approval of the Local Government Board, and to a certificate from a competent person as to the condition of the distribution system.

BRADFORD CORPORATION GAS AND ELECTRICITY SUPPLY.

The Half-Yearly Accounts.

At the Quarterly Meeting of the Bradford Town Council last Tuesday—the MAYOR (Mr. W. Oddy) presiding—the balance-sheets of the Gas and Electricity Departments for the past half year were submitted for adoption.

Alderman F. PRIESTMAN, in moving the adoption of the minutes of the Gas and Electricity Supply Committee, said he had before him the balance-sheets for the past six months. As to the Gas Department, there had been a considerable reduction in the receipts for residuals, by comparison with the corresponding period of 1891, amounting altogether to: For coke, £800; for tar, £2200; for spent oxide, £600; and for sulphate of ammonia, £500. Fortunately, there had been a considerable increase in the consumption of gas during the half year; the total receipts amounting to £73,342. On the expenditure side, the Committee had paid for coal £700 less than in the corresponding half of the preceding year, and this was not the only benefit they had derived. They had carbonized 500 tons more in the half year; and yet there was a reduction of £700 in the carbonizing wages, which was largely accounted for by the employment of machinery at the Birkshall works in place of hand labour. The other items of expenditure were pretty much the same as they were in the corresponding half of 1891. The Committee had paid through the sinking fund £4198; and for interest on loans, £9232. Taking all these figures into account, there was a profit on the Gas Department for the half-year's working of £2274, as against a loss in the corresponding period of £868. This profit was made after including in the expenditure about £700 spent on the repair of the damage caused by the recent explosion at the Valley Road works. The quantity of coal carbonized had been 77,098 tons; and gas had been made to the extent of 799,250,000 cubic feet—this being 10,366 cubic feet of gas per ton of coal, or an increase of 320 cubic feet per ton upon the figures for the corresponding half of 1891. This was to be attributed mainly to careful management. The quantity of tar made during the half year was 4746 tons; and of liquor, 10,241 tons. The number of ordinary public lamps in the borough was now 5970, as against 5874 in the period with which comparison was being made; and there were now 760 Bray lamps employed in the streets. The electricity accounts showed that the Committee had sold electricity of the value of £4549, which was about £1000 more than in the corresponding six months of 1891. The other receipts were practically similar in the two half years. Coming to the expenditure side, he found that coal had cost very little more; that coke (of which none was used in the corresponding half) had cost £48; that repairs of tools and implements had cost £68, as against £17; repairs of works and plant, £143, as against £21; and repairs of machinery, £189, as against £11. It would be seen, therefore, that the works were being kept in efficient condition out of revenue. There was an item of £391 for trenching in Kirkgate and other parts of the town, and they had paid through the sinking fund £577, as compared with £398, and for interest on loans £719, as against £545. The result of the half-year's working of the electricity department, after accounting for all these matters, had been a profit of £1089. Taking the general balance-sheet of the department, they had spent £48,568 on capital account. The general balance-sheet showed that they owed to the bank £4380; that there was owing on account of loans £47,291; and that they had paid through the sinking fund from the commencement £3198, which had all been provided out of revenue. Taking the history of the working of the department since its commencement, it would be seen that in 1889 there was a loss, including payments on account of sinking fund and interest, of £1079; in the half year to June 30, 1890, there was a loss of £732; in the December half, a loss of £315; and in the first half of 1891, a loss of £30. For the second half of 1891, there was a profit of £970; for the first half of 1892, there was a profit of £387; and last half year, there was a profit of £1089. So that, from the commencement of the work of the department, they had extinguished the whole of the loss resulting in the earlier stages, besides paying interest for sinking fund; and there was a net profit on the undertaking up to date of £290. Perhaps it would be of interest to the Council also to know whether they were working as economically as other people. Therefore, for the purpose of challenging comparison, he would state that the numbers of units of electricity sold in the last four half years were 85,103 and 154,258 in the first and second halves of 1891, and 141,622 and 224,232 in the same periods of last year. The coal used per unit in the same four periods was as follows: 16 lbs. and 12·58 lbs. for 1891, and 12·5 lbs. and 10·1 lbs. for 1892. So far as they could find out, the lowest consumption on record at any central station had been 8 lbs. per unit; and this was obtained from Welsh coal at 27s. per ton; whereas the cost of the coal used at Bradford was about 8s. 6d. The cost of coal per unit for the four periods referred to were respectively 0·67d., 0·53d., 0·56d., and 0·42d. During the last half year, 41 new customers had been obtained; and there were still many applicants.

Mr. J. KAY seconded the motion.

Mr. WALKER asked if, in his next half-yearly statement, Alderman Priestman would include the electricity used by the Bradford Corporation in the Town Hall, Free Library, and other public buildings. He asserted that the cost of lighting the Town Hall clock alone amounted to £800 a year; and that, owing to the pressure of the Chairman of the Gas Committee, the Corporation were now using a third of the electricity produced, so that Alderman Priestman might be able to make out that it was paying.

Alderman PRIESTMAN reminded Mr. Walker that the cost of lighting the Markets and Town Hall did not enter into last half year's electricity balance-sheet at all, as they were new works, and at the Free Library the electric light had been used in a very economical way.

The minutes were then adopted.

Reduction in the Price of Gas.—The Shipston-on-Stour Gas Company propose to shortly make the substantial reduction of 10d. per 1000 cubic feet of gas. The charge will then be 5s.

SUTTON-IN-ASHFIELD LOCAL BOARD GAS SUPPLY.

Dangerous Condition of the Gas-Works.

In the JOURNAL for Dec. 13 last (p. 1045), reference was made to the serious state of the Sutton-in-Ashfield Gas-Works, which had formed the subject of a discussion at a recent meeting of the Local Board of that town. It arose on the presentation of the Gas Committee's minutes, in moving the adoption of which Mr. Allsop alluded to the monthly report of their Consulting Engineer (Mr. C. E. Jones, of Chesterfield), which showed that the works were in a very unsatisfactory condition. The matter came up again at the meeting of the Board on the 3rd inst., when the monthly report presented by Mr. Jones was simply alarming. He stated that the manufacture of gas had proceeded much as usual. Three out of the four weeks in the month showed an augmented quantity of gas sent out of the works, at less cost in wages than in the corresponding period of last year. The increase in the output was limited to the capacity of the works, and must not be taken as indicating the full measure of the public requirements, which were not satisfied owing to the insufficient gasholders, and the totally inadequate and withal dangerous purifiers at the works. That an increase of 4·29—or (say) 4¼—per cent. was obtained must, so far as it went, be considered satisfactory; but if a greater volume could have been dealt with, it would have been sold. Enlarging upon this subject of the defective purifying plant, Mr. Jones said: "Again I have to point out the danger attending the use of the old purifiers—far too small, worn out, and full of holes, which have to be stopped with plastic clay and sacks. The loss of gas from the covers is considerable; and inasmuch as the purifying-house is situate between the fires of the old and the new retort-houses, an explosion may occur at any time. Each month the process of decay goes on, and the danger increases; indeed, it would not surprise me at all to hear of your being blown up into the air and coming down in pieces." Mr. Jones went on to urge upon the Board the necessity of putting in hand the proposed extensions. If they desired to complete the work and set their house in order before next winter, it would, he said, be necessary to begin without delay. He recommended that, as the retorts in use in the old retort-house became worn out, they be demolished, and the carbonizing work confined to the larger and more suitable new building. Mr Allsop, in referring to the report, said the Board would see, from what the Engineer had stated, that the works were in a very unsatisfactory condition. The old purifiers had been in use 30 years. The Chairman (Mr. J. C. Sampson) remarked that it was a very alarming report. Mr. Jarvis stated that it was a very serious matter; and he thought it highly desirable that the Board should take immediate steps to put the works in a state of safety. He was not aware things were so bad; and the Board, as representatives of the parish, ought to see to it at once. Let them resolve themselves into a committee then and there if they had time, to consider the best means of putting in new purifiers immediately. He moved a resolution to this effect. The Chairman said he had pleasure in seconding the motion. If an explosion did take place, it would mean a great loss of life and considerable damage to property. Mr. G. G. Bonser suggested that the Gas Committee should move at once in making the purifiers safe. It was explained by the Manager that one of the purifiers was corroded beyond reparation, and that it was patched with clay and other materials; but so long as a vigilant watch was kept upon it, the works could be carried on all right. The proposition was carried. After the meeting, the members formed themselves into a Committee, and decided to take immediate steps to place the works in a satisfactory condition.

Electric Lighting for Hanley.—The Hanley Town Council have received the sanction of the Local Government Board to the borrowing of the money required for an installation of the electric light. At the inquiry held into the subject for the Board by Major-General Crozier (see *ante* p. 25), it was stated that the tender of the Brush Electric Engineering Company for £15,760 had been accepted.

The Agitation against the New Railway Rates.—According to a paragraph which appeared in *The Times* last Friday, the railway agents in South Staffordshire received from their respective head offices on the previous day numerous lists of revised charges for the carriage of iron, coke, and other heavy traffic. Many of these are, it is stated, a return to the old rates; and in some cases allowances are made for the difference in weight of charging for 20 cwt., instead of the former 21 cwt, to the ton. In consequence of the alteration, there is keen competition between the railway companies' agents for some extensive traffic which has been waiting delivery, among which, we believe, is a contract taken for 7000 tons of constructive wrought iron and large castings for gas-works extensions in the Metropolis.

Proposed Acquisition of the Runcorn Water-Works by the Loca Authority.—A special private meeting of the Runcorn Improvement Commissioners was held on Monday last week, to consider the question of the purchase of the undertaking of the Runcorn, Weston, and Halton Water Company. About a month ago, the Board decided to pay £67,000 for the property; but since the Bill has been promoted in Parliament for authority to complete the purchase, some mistake has arisen which the Commissioners contend has materially reduced the value of the concern. After long deliberation yesterday week, the Board unanimously adopted the following recommendation of the Finance Committee: "(1) That a letter be sent to the Water-Works Company acknowledging their promise to make good the defects specified by Mr. Newton (the Engineer engaged to inspect the plant), and pointing out the representations and basis on which and reciting how the proposed purchase-money of £67,000 was arrived at, and stating that independently of the legal aspect of the agreement, the Company were bound in honour to reduce the purchase-money in so far as such representations and basis have been proved to be mistaken; (2) that in case the Company refuse to reduce the purchase-money to such a sum as may be agreed upon between them and the Commissioners, clause 6 in the Runcorn Water Bill now before Parliament be withdrawn, and a clause giving power to purchase the water-works undertaking either by agreement or arbitration be substituted therefor, and the other consequent alterations made in the Bill."

THE DUBLIN CORPORATION BILL.

The Proposed Additional Water-Works and the Progress of the Department.

The above Bill was laid before a meeting of the owners and ratepayers of Dublin last Thursday week, for the purpose of approving of its promotion by the Municipal Council. Its object is to obtain additional borrowing powers to the extent of £300,000 for the purpose of improving the main drainage of the city, and £120,000 for water-works purposes. The Lord Mayor, in explaining the provisions of the Bill relating to the water supply, said they were proposing to lay a second pipe-line from Vartry to Stillorgan. The pipes that were laid down 25 years ago had become oxidized and corroded; and accumulations of rust and deposits made during the passage of the water from Vartry had seriously reduced the dimensions of the water-way, and diminished the flow of water to the Stillorgan reservoirs. The result was that one of the reservoirs was absolutely empty, and the other was less than half filled. This was a threatening state of affairs, and one which the Council, having regard to the health of the citizens, could not allow to continue. The Borough Surveyor had declared that it was imperatively and immediately necessary that a second line of pipes should be laid. When either this should be done or a conduit constructed, it would be possible to overhaul and cleanse the original pipes; and then, with the double or alternative service, an uninterrupted supply of water to the city would be practically assured. The water-works were at the present moment highly remunerative; and they had no doubt that, when the second line of pipes had been laid down, and the demands of the surrounding townships for an increased supply of water had been satisfied, the receipts of the department would be materially increased, and would form a very paying revenue as against the contemplated outlay. In carrying out these important schemes, the Corporation had to face a financial difficulty. They were restricted in their borrowing powers by the Public Health (Ireland) Act to a sum not exceeding double the valuation of the city. For necessary purposes heretofore, loans had been obtained to within £200,000 of the available margin. The enormous sum that was spent in the construction of the water-works was charged to the borrowing powers of the Corporation under the Public Health Act; while in several English towns any money required for a like purpose had been borrowed under special powers. They in Dublin thought they should have similar facilities; and that was an object in view in promoting the present Bill. His Lordship then moved the resolution approving of the Bill. Mr. Robinson having seconded the motion, Mr. J. Walker, one of the members of the Water Committee, gave a few figures, showing the substantial progress made by the Water Department during the past 20 years. In 1872, he said, the domestic water-rate was 1s. in the pound; and the revenue from every source amounted to £44,799. In 1892 the domestic water-rate was only 4d. in the pound; and the revenue was £47,943. In 1872 they obtained from contracts and water sold by meter, £11,421; and in 1892, £17,394. In 1872 the revenue from the surrounding municipal districts was £3426; and in 1892, £11,453. The result was that, outside the ordinary domestic water supply, they sold by contract to manufacturers and others, £14,847 worth of water in 1872; while in the past year the sales amounted to £28,850. After some remarks by Mr. Treacy in support of the resolution, it was carried unanimously.

THE MARGATE DRAINAGE WORKS.

In the course of the Inaugural Address delivered by Mr. W. A. Valon, of Ramsgate, at the opening meeting for the present session of the Society of Engineers (see *ante*, p. 223), he referred to the drainage works which have lately been completed at Margate, at a cost of £80,000. It may, therefore, be of interest to reproduce, from the *Engineer*, the following particulars of the undertaking.

The nature of the levels of the area comprising the district of the Municipal Authority, did not allow of all the sewers directly gravitating to the main outfall; five-sixths of the area discharging direct into the intercepting and outfall sewers, the remaining one-sixth having to be pumped from chambers receiving the sewage of the low levels. This pumping is effected by a pair of Worthington compound horizontal pumping-engines—in duplicate—driving the high-pressure water through a 3-inch hydraulic main, at a pressure of 700 lbs. to the square inch, to the three pairs of automatic hydraulic pumps situated in the pump chambers; each of these automatic pumps being capable of lifting 1,152,000 gallons of sewage in 24 hours, or a total of 3,500,000 gallons from the three pairs of hydraulic pumps. A similar pair of automatic pumps is located on the low-level system of surface water drainage (which is independent of the sewers in this district), which are required only to be brought into use at the time of heavy rainfall occurring during the period of high water; these pumps being driven by the same power as the six automatic sewage-pumps. All these pumps are controlled by self-acting floats, which open and close the valves of the hydraulic subsidiary engines, according to the volume of sewage to be dealt with in wet or dry weather.

The 30-inch iron outfall sewer, discharging into the sea, has been carried out 600 yards from the face of the chalk cliffs. A storeage reservoir sewer of brickwork and concrete 7ft. 6in. in diameter has been provided, capable of containing the sewage of the entire district during the daily period at which the discharge into the sea is not able or permitted to take place; a penstock chamber being situated at the junction of the large tank sewer and the iron outfall. The main outfall brick and concrete sewers passing in tunnel through the chalk cliff, at a distance of from 100 to 150 yards from the shore, are mainly oval in construction—the dimensions being 4ft. 6in. by 3ft., 4ft. by 2ft. 8in., 3ft. 6in. by 2ft. 9in.; and there is a 2-feet circular one. They are continued to the extremities by 21-inch and 18-inch pipe sewers, according to the relative requirements of the various areas which are drained into the main outfall sewer.

All the main and subsidiary sewers are laid in straight lines from point to point; there being a manhole at all the points of lateral deviation. These manholes are ventilated by Latham's patent charcoal ventilating covers. Ventilators are also provided at the head of all dead-end sewers; and where these are in too close proximity to the buildings, they are carried up to the summit of the roofs of the houses by a shaft.

Some gullies for the surface water have been constructed upon the roads, in which the sewers gravitate naturally to the outfall sewer. In the districts sewered which have to be pumped, the street surface water is not admitted to the sewers. The rain water from roofs and paved courts of the houses, however, being connected with the house drains, is carried to the pump wells.

Numerous automatic syphon flushing-tanks are constructed, which, in the case of the gravitation sewers, are fed from the pipes of the town water supply. In the pumped sewer districts, the exhaust water from the hydraulic-power cylinders and engines is carried to the flushing-tanks; thus obviating any waste of the power water used for the hydraulic pumps.

The whole of the works, inclusive of machinery, have been carried out by Messrs. B. Cooke and Co., of Battersea, from the designs of the Engineer for the scheme, Mr. Baldwin Latham, M.Inst.C.E., F.G.S.; the Resident Engineer being Mr. W. Fletcher Robinson.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Since I wrote last of the finances of the Glasgow Gas Trust, it is satisfactory to learn that a change has taken place which takes away the point of my then remarks, at which no one can be more delighted than I am. There was, at the end of December, a decrease of over £500 in the gas-rental collected, and that notwithstanding the advance of 3d. per 1000 cubic feet in the price of gas. This led me to regard the outlook as not very cheering, seeing that the Trust have this year before them the task of wiping out a deficit of £26,000 odd. There is doubtless quite sufficient reason in the management of the undertaking—such as the dates of the collection differing, and the like—for the figures showing the variation they do. It is satisfactory, however, to know that the revenue from the sale of gas has gone up with a bound; and that there is now an increase over the sum collected at the same date last year of nearly £30,000. Should this increase be augmented before the year is out, and taking into account the decreased cost of coal, the deficit will be a great deal more than wiped out. There is, however, I learn, a fall of nearly £13,000 in the revenue derived from residuals, which is not so satisfactory; but it has doubtless been anticipated, and allowed for. The business of the Trust in the sale and hire of gas stoves and heating apparatus continues to grow. There are now over 11,000 of such appliances on hire, and nearly 14,000 have been sold. In fact, I do not know of any town in which there is such a large proportion of gas heating and cooking apparatus in use as there is in Glasgow. This is a consequence of cheap gas, which other bodies supplying gas might take into account. In this connection, I may perhaps be allowed to mention a circumstance which presents the Glasgow gas supply in a light in which I have never seen it regarded. A newspaper correspondent has worked out the equivalent price at 16 candles of the 23-candle power gas supplied in Glasgow at 2s. 9d. per 1000 cubic feet, and finds that it comes to 1s. 10d. per 1000 cubic feet. This is as low as Newcastle; and there is not, within my knowledge, cheaper gas provided anywhere in the United Kingdom, unless it be Paisley. The Trust are making fast strides in the improvement of their works. Not to speak of renewals and extensions, they are carrying out improvements which will lead to the more efficient and economical working of their different stations. One of these is the construction of a tunnel under the Forth and Clyde Canal, to connect their Dawsholm works with the Temple works, which they acquired from the Partick, Hillhead, and Maryhill Gas Company nearly two years ago. Another scheme which is in contemplation is the formation of a siding from the Caledonian Railway Company's system into the Dawsholm works. At present, if any of your readers who do not belong to Glasgow should visit the city, I would advise them to be careful how they move about after dark. In some parts the streets are in a terribly cut up condition, and dangerous holes are numerous. There is already in existence an underground railway, belonging to the North British Railway Company, which traverses the city from east to west. The Caledonian Company are engaged in the construction of another underground line, almost parallel to it, a little to the south, which will give them access for the first time to the north-western portion of the city, and allow them to run trains on the north bank of the Clyde to the west of Glasgow. It is with this new line that the Dawsholm works are proposed to be connected. The advantage will, of course, be that the Gas Trust will have the benefit of competition in the delivery of coal, as well as greater certainty in the supply. In addition to these two lines, I may mention that at present a third underground railway is being constructed by an independent company, which will provide a circular route, striking the others at right angles in the centre of the city. There has of late also been a very great cutting up of the streets in the central part, in connection with the laying down of the electric light mains. These works have all entailed much discomfort upon the inhabitants, and justify the caution I have given above. On the other hand, when they are completed, they will prove of great service to the community. Glasgow will then be provided with a service of inter-communication which not even London itself possesses. So much public enterprise is a good augury for the future of the city which at present holds the position of second in the Empire.

Sheriff Cowan at Paisley this week conducted, on behalf of the Secretary for Scotland, an inquiry into the circumstances connected with the application by the Corporation of Paisley for a Provisional Order authorizing the borrowing, under the Paisley Corporation Gas Act of 1870, of an additional £20,000 for the extension of the gas-works. The application is opposed by several members of the Corporation and by some ratepayers, who hold that extensions should be

paid for out of revenue. The dispute really arises upon the practice of the Corporation of appropriating the surplus revenue from the gas undertaking for town improvements. In opposing this practice, the objectors deserve support. But, on the other hand, it is an advantage, in the borrowing of money, to have ample powers; and I humbly submit that the present is not the time to fight the vicious practice. It should be done when the question of the disposal of the surplus comes up in the Town Council. At present the Corporation stand in this position, that they have borrowing powers to the amount of £109,000; but they have, in reality, borrowed £128,835, of which, however, they have repaid £54,985—leaving an indebtedness upon the undertaking of only £73,940. The Corporation have been exceedingly successful in their management of the gas-works, for which they have to thank Mr. G. R. Hislop, their Manager. Their borrowing powers are, however, exhausted; and it is folly to say that they should not be enabled to raise money by an authorized method. No matter how the balance-sheet may stand at the end of the year, it is not fair to the consumer that he should be required to furnish the means of cheapening gas for his successors. Extensions should be paid for out of capital, and the repayment of the capital be spread over the number of years the extensions are estimated to serve. In this way, the Corporation might be able to lower the price of gas, and thus be enabled to keep out other illuminants. If extensions are to be paid for out of revenue, the price of gas must be kept up, or the contributions to town improvements stopped. But in all such matters, it is the general question which should be looked at; and there can be no doubt that the borrowing powers should be granted. The Sheriff will report to the Secretary for Scotland upon the effect of the evidence which was led.

The Galashiels Gas Company have contracted with Mr. John Dennis, of Dalkeith, to fit up an oil-gas plant upon the system of Mr. W. Young, of Peebles, in their works. At present plant capable of producing 120,000 cubic feet of gas per day is to be erected; and this is expected to be in operation in less than three months. This is the first introduction of Mr. Young's process outside the works at Peebles; but others have made application for leave to use it. The Edinburgh and Leith Gas Commissioners are among those who are making inquiries with a view to its adoption; and a deputation from Edinburgh are shortly to visit Peebles, to see the plant in operation. The Galashiels Gas Company have for a long time occupied the position of supplying a rich quality of gas—from 28 to 30 candle power—at the cheapest proportionate rate in the kingdom. By the introduction of Mr. Young's oil process, they expect to be able to produce gas at a reduced cost of somewhere about 8d. per 1000 cubic feet—16d. instead of 24d.; and they estimate that the saving will be such that, in six months they will recoup themselves for the total outlay upon the plant. By its means, they will be able to compete with the cheap oils which are in the market, as well as to keep out electric lighting speculators. Mr. Dennis, to whom the contract has been entrusted, has been largely employed in the erection of the Young and Beilby patent retorts in oil works.

The two newspaper controversies which I mentioned last week as being in existence—upon Mr. Young's oil-gas process, and the relative cost of electric and gas lighting—have been continued this week; but they have not resulted in any new development. In the former, Mr. A. Bell, the Gas Manager at Peebles, replied on Tuesday to Mr. D. M. Nelson's letter of last Saturday. This letter was moderate in tone, as was also Mr. Young's preceding communication, and consisted chiefly of a reiteration of what Mr. Young had said, including a renewal of the invitation to visit Peebles. In the other matter, there have been letters from both Mr. Carmichael and Mr. Turnbull; but the controversy between them has settled down into a personal one. Mr. Carmichael, or at least the community, will be put right when Mr. Turnbull reads the remainder of his paper to the Merchants' Association.

All philosophers are not wise men; and probably most scientific principles, before they arrive at the stage at which they are generally accepted, pass through a chaotic period, in which much that is afterwards looked upon as balderdash is talked. I am inclined to think, from what was recently said at a meeting of the Royal Society of Edinburgh, that the theory of fogs has not yet passed the stage to which I allude. Mr. John Aitken is well known to be an inquirer into the phenomena of clouds and fog; and in a communication he made to the Society, in supplement of previous papers on the same subject, he expressed himself as having come to think that in town fogs it was not so much the number of dust particles that one had to fear as the composition of them. The thing to be aimed at, thereforee, was to convert the particles having an affinity for water into others having an indifference to water. This was all very well; and so was Lord M'Laren's remark, that before any attempt was made to force upon the public certain ideas which, to say the least, were somewhat premature, it was the duty of the nation to investigate the question on a larger scale than had hitherto been attempted. But what is to be said of remarks by Mr. Caddell, of Grange, who suggested that fogs in Edinburgh might be due to the inferior quality of the gas which is supplied? Why should a gentleman who is considered fit to take part in the proceedings of the foremost scientific body in Scotland, give expression to the opinion that there is impurity in Edinburgh gas, unless he can show that it exists? His remarks applied to sulphur. Now the analyses by Mr. Falconer King, the City Analyst, show the gas to be exceedingly free from this impurity; and yet this professed scientist was unscientific enough to say that "he understood there was a large quantity of sulphur in the Edinburgh gas, due to an inferior quality of coal being used. He dared say members had noticed that fogs had become more prevalent in Edinburgh within the last few years than formerly; and it might be that they were coincident with the bad gas in Edinburgh, and with the large amount of sulphur used in its manufacture, and discharged into the air. This might be remedied if Mr. Aitken's paper were sent to the Edinburgh Gas Commissioners." There are in these two impertinent assumptions—(1) that inferior coal is used in the Edinburgh Gas-Works; and (2) that bad gas is sent to the consumers. On neither point did he give any reasons for his belief; and though he speaks of "coincident with the bad gas," he does not say when that time was. Albeit that he is apparently a member of the Royal Society, he does not exhibit a great deal of wisdom. He speaks of "the large amount of sulphur used in its manufacture and discharged into the air." He does not seem to know that gas is manufactured and purified in closed vessels, and that all the sulphur in the coal is retained in these, and not "discharged into the air." Furthermore, he seems to forget that in his own house, and in every house in the land in which coal-fires are employed, and in every manufactory, and in the furnace of every locomotive on the railways, coal is every day consumed openly; and the emitted gases from the thousands of tons dealt with, including sulphur, are discharged into the air. If the sulphur theory holds good, it is to that cause, and not to the tiny quantity derived from the Edinburgh gas, that any fogs on the east coast of Scotland may be attributable.

The Glasgow Town Council have let the contract for the construction of the Black Rig section of the new Loch Katrine aqueduct to Messrs. Morrison and Mason, Limited. The tender of the successful firm was £86,582 14s. 3d. At the Council meeting last Thursday, there was some cavilling at the lowest offer—£79,000—not having been accepted; but, after discussion, the recommendation of the Committee, that Messrs. Morrison and Mason should be the contractors, was agreed to. The firm hold other important contracts for the same works.

The County Council of Aberdeen have resolved to oppose the Aberdeen Corporation Bill which is at present before Parliament. The Bill proposes to confer powers upon the Corporation to construct sewage works at various places in the valley of the River Dee, and to charge the cost upon the County Council. This the Council regard as dangerous, inasmuch as it takes out of their hands a matter which they consider lies within their jurisdiction. Another question of a novel nature in connection with the water supply of Aberdeen has arisen. The Great North of Scotland Railway Company are at present seeking powers from Parliament to construct a water-supply system for their head-quarters in Aberdeen. They propose to form a reservoir about 10 miles on the north side of the city, and to lay a line of mains along the railway to their several stations. Into the general station at Aberdeen there run, from the south, the trains of the Caledonian and North British Railway Companies; and it is proposed in the Bill to supply these Companies with water. As this would mean the withdrawal from the Corporation of a large revenue from the sale of water, the Water Committee have resolved to oppose the Railway Company's Bill. They look upon it that the Company were incorporated to construct a railway, but not for supplying water. The Company are willing to restrict their Bill to a provision of water for themselves only; but this does not satisfy the Corporation.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 18.

Sulphate of Ammonia.—There has been a further development in the market; and values show considerable strength at the close of the week. There has been a gradual advance; and now £10 12s. 6d. is quoted at the ports. The improvement will probably be ascribed to the strong nitrate market; but this in reality cannot altogether be the case, as the principal demand does not emanate from the Continent, but from the dealers on this side, whose movements have been thwarted by the extreme scarcity of sulphate—almost unparallelled at this time of the year. What will happen next month under existing circumstances, when a strong consumptive demand will set in (unless there should be a return to wintry weather), it is difficult to say. It is hardly necessary to point out again that, in consequence of the rise in nitrate (now 10s. per cwt.), sulphate is again ever so much the cheaper commodity; the relative value of each unit of nitrogen being in nitrate about 13s., against only 10s. 9d. in sulphate.

LONDON, *Feb.* 18.

Tar Products.—The "spurt" in these seems to have for the present fallen off; and prices all round are scarcely so firm as during the past few weeks. In Benzols there is not much business reported; but the prices are nominally 1s. 7d. to 1s. 8d. for 90's, and 1s. 4d. to 1s. 5d. for 50's, although buyers do not seem much disposed even to cover at these prices. Neither carbolic acid nor cresylic acid is so brisk; and although 2s. 3d. for 60's carbolic and 1s. 10d. for cresylic acid are the prices asked by sellers, there does not seem any anxiety on the part of buyers to cover. Anthracene maintains its position, and a considerable business is being done. Pitch is for the present a shade quieter; and prices for forward delivery are somewhat short of those for prompt. Prices are as follows: Tar, 11s. to 13s. Pitch, 27s. Benzols, 90's, 1s. 7d.; 50's, 1s. 4d. Solvent naphtha, 1s. 3d. Toluol, 1s. 5d. Crude benzol naphtha, 30 per cent., 7½d. Creosote, 1¾d. Creosote salts, 20s. Carbolic acid, 60's, 2s. 3d.; 70's, 2s. 6d.; crystals, 8d. Cresol, 1s. 10d. Anthracene, 30 per cent., "A," 1s. 2d.; "B," 10d. nominal.

Sulphate of Ammonia has considerably improved during the week, and leaves off at about £10 12s. 6d., less 3½ per cent., with a good demand. With a prospect of higher prices for nitrate of soda, the value of sulphate should still further advance. Gas liquor is quoted at 7s. to 8s. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—If anything, there is an increasing depression throughout the coal trade of this district; and in view of the very discouraging outlook all through, the leading colliery proprietors are seriously considering whether the threatened action on the part of the Miners' Federation, of resorting to a general stoppage of work, with the object of preventing any reduction in wages, shall not be met by some decided action on the part of the colliery owners themselves. From what can be gathered, there is a very strong feeling generally in favour of intimating to the miners that, so far from their taking into their own hands the regulation of the output, the pits will at once be put on short time, and that this will be accompanied by a substantial reduction in wages. Should such a policy be put in force, there is no doubt it will be met by a general strike on the part of the miners; and that in any case there will be a serious struggle with the men before very long, is looked upon as almost a certainty. With regard to the demand, all descriptions of fuel are hanging upon the

market. The better qualities are moving off very slowly for house-fire purposes; and, although it is exceptional where there is any actually quoted reduction on list-rates, the tendency of prices is decidedly downwards. The average pit price for best Wigan Arley coal may, however, still be quoted at 12s. to 12s. 6d.; Pemberton four-feet and second qualities of Arley, 10s. to 10s. 6d.; common house-fire coals, about 8s. per ton. The most depressed section of the market continues in the inferior qualities of round coal; and for these, excessively low prices are being taken, which in some cases it is stated represent a loss of 2s. per ton upon the actual cost of getting. Steam and forge coals can be readily bought at about 6s. 6d. to 7s. per ton at the pit mouth; and for quantities, prices are subject to special arrangement. Engine classes of fuel are also becoming more plentiful in the market, owing to the continued dispute in the cotton trade, and the extended area of the mill stoppage. In many instances, however, colliery owners are preferring to put into stock rather than push sales at low figures; and at some of the pits, very large quantities have already accumulated. At the pit mouth, burgy scarcely averages more than 6s. per ton; best qualities of slack, 4s. 9d. to 5s.; medium, 4s. to 4s. 3d.; and common, from 3s. to 3s. 6d. per ton. The shipping trade continues extremely quiet; and ordinary steam and forge coals do not average more than 8s. to 8s. 3d. per ton, delivered on the Mersey.

Northern Coal Trade.—There is a slight improvement in the coal trade, due partly to an increased demand in anticipation of stoppages of production in some coal-fields. Still, this has not yet become sufficient to cause the collieries generally to have full work; and as some pits in the neighbouring coalfield of Cumberland have continued work with heavy reductions of wages, the idea is that the disputes may be arranged. Best Northumbrian steam coals vary from 8s. 6d. to 8s. 9d. per ton f.o.b., less discount; and at that low price the collieries have not full working orders. Second-class coals are 8s., and small steam coals, about 3s. per ton. Bunker coals are very dull; and may be had from about 6s. per ton for unscreened qualities, up to perhaps 8s. 6d. per ton for Durham screened. A medium price for gas coal may be given as about 6s. 3d. to 6s. 6d.; but there have been sales both at lower and higher prices. Smithy coals are selling high—for one or two preferred kinds about 9s. per ton f.o.b. is asked. Coke is weaker in price—best Durham kinds for export being offered at 14s. per ton f.o.b. In gas coke, there have been only very limited transactions of late; but the production is now being reduced. Prices are unaltered.

Scotch Coal Trade.—There is, as yet, no prospect of improvement in the coal trade in Scotland. On Thursday a general reduction in miners' wages of 6d. per day took place over the West of Scotland; and the Fife coalmasters are expected to follow. Wages are already 25 per cent. lower than they were little more than a year ago. The masters expect, by getting them further down, to be able to make a bid for the Continental trade, which they have been awaiting for several weeks. Stocks of all descriptions are still accumulating. The only description for which there has been any demand this week has been ell. The worst feature, as showing how dull are the productive industries, is that steam coal is in little demand. The quotations this week are: Main, 6s. 6d.; ell, 7s. 3d.; splint, 7s. 3d.; and steam, 8s. 6d. to 8s. 9d. per ton f.o.b. Glasgow. On account chiefly of the stormy nature of the weather, the shipments have declined. For the week they amounted to 92,561 tons—a decrease of 8331 tons upon the quantity shipped in the preceding six days, and of 15,592 tons as compared with the quantity in the corresponding week of last year. For the year to date, the total shipments have been 557,005 tons—a decrease as compared with last year of 64,897 tons.

Electric Lighting for Blackpool.—A Local Government Board inquiry has been held at Blackpool by General Crozier, R.E., into the application of the Corporation for power to borrow a sum of £26,000 for purposes of electric lighting in the borough. The Town Clerk explained that Blackpool was one of the first towns to use electricity as a public illuminant; and it was hoped that the extension of the system would be the means of developing the attractions and increasing the prosperity of the borough. Representatives of the Tradesmen's Association and of various places of amusement supported the application; and there was little opposition.

The Heckmondwike Local Board and the Gas Company.—The Heckmondwike Local Board have recently addressed a letter to the local Gas Company, complaining of the excessive leakage of gas from the mains and of the quality of the gas. The subject was mentioned at the meeting of the Board last Tuesday by Mr. Redfern, who quoted figures showing that, according to the Board of Trade returns, the leakage was more than 17 per cent. in excess of the average of 422 undertakings, and that the consumption of coal was 10 per cent. more than the average—the two excesses representing a loss equal to £2400 per annum. It was resolved to write to the Company pressing for an early reply to the Board's communication.

Lambeth and the Electric Light.—The Electric Lighting Committee of the Lambeth Vestry have consulted Mr. W. H. Preece as to the best mode of carrying out the Provisional Order granted by the Board of Trade to the Vestry last year. In his report to the Committee, Mr. Preece remarks that it has been the fashion to regard the electric light as the "light of luxury," and strange views are frequently expressed as to its costliness, and as to its being within the reach only of the rich. The experience at Newcastle, where the price of gas is only 1s. 10d. per 1000 cubic feet, and at Bradford, shows, he says, that it is now within the grasp of the poor man. The average cost per electric lamp per annum at the former place was last year 6s. 3d.; and at the latter place, 9s. 7d. Electricity can now be produced cheaper than gas. He is at present engaged, he goes on to remark, in determining the best and cheapest mode of fitting up small tenements, so as to bring the light within the reach of the poor. He estimates that the total capital required to light the entire parish of Lambeth will probably eventually reach £300,000; but he adds that it will take some years and much prosperity to attain this result. To comply with the requirements of the Order and to make a good start will not require more than £75,000, for which sum sufficient plant can be obtained to supply energy to 20,000 lamps alight at one time, which would mean 40,000 lamps fixed.

The Water-Works Purchase Question at Chatham and Rochester.—Our local correspondent writes: "The triangular duel which was threatened between the Municipal Authorities of Rochester and Chatham and the Local Authority of Gillingham over the Bills which have been presented to Parliament for the acquisition of the Brompton, Chatham, Rochester, and Gillingham Water Company's undertaking, has (for the time being, at any rate) terminated in a compromise. It will be remembered that the Chatham Town Council promoted a Bill which, if passed, would have enabled them to purchase the water-works. Thereupon Rochester introduced a similar Bill; while Gillingham, which has not yet aspired to the dignity of a chartered corporation, resolved to oppose the applications of both Chatham and Rochester—the Water Company, of course, opposing also. The result of this condition of affairs has been an agreement between the Corporations of Chatham and Rochester to withdraw their respective Bills, on the understanding that, if terms can be agreed upon, the authorities of Chatham, Gillingham, and Rochester will join in promoting a Bill next session to purchase the property of the Water Company for the purpose of carrying it on under a Joint Water Board." The withdrawal of the above-mentioned Bills is recorded in our "Parliamentary Intelligence."

The Electric Lighting Question at Maidstone.—The scheme for the Town Council of Maidstone to undertake the electric lighting of the borough is meeting, says our local correspondent, with strong opposition. The most weighty argument in favour of the scheme appears to be a desire to retain the powers of the Provisional Order, rather than risk the introduction of an electric lighting company into the town. At the meeting of the Maidstone Town Council last Wednesday, the electric lighting scheme as submitted by Mr. W. C. C. Hawtayne, showed a probable expenditure of £10,450, while he makes the relative cost of gas and electricity as working out as follows: "The average gas-burner gives a light of not more than 12-candle power for every 5 cubic feet of gas consumed, while an incandescent lamp of 16-candle power requires some 60 watts. At this rate, the gas required for 16-candle power is $16 \times 5 \div 12 = 6\frac{2}{3}$ cubic feet. Now, one Board of Trade unit = 1000 watts. The relative cost of gas and electricity is therefore: (1) $6\frac{2}{3}$ cubic feet of gas, at 2s. 6d. per 1000 = 0·20d. per hour; (2) 60 watts of electricity, at 6d. per 1000 = 0·36d. per hour; (3) do., at 6½d. per 1000 = 0·39d. per hour. Or, for a similar amount of light, electricity at 6d. per unit costs 4s. 6d. where gas costs 2s. 6d.; electricity at 6½d. per unit costs 4s. 10½d. where gas costs 2s. 6d." The report presented was rather lengthy, and worked "in the air" on the possibilities of profits. The Council came to the conclusion that it did not justify the adoption of the scheme; but it was further resolved to obtain information as to the terms upon which a company would carry out the Order.

The Prevention of Strikes.—At the Working Men's College, Great Ormond Street, on the 4th inst., Mr. D. F. Schloss (whose article on "The Dearness of Cheap Labour," in the *Fortnightly Review* for January, was noticed in the JOURNAL for the 17th ult.) delivered a lecture on "The Prevention of Strikes." He began by pointing out the advantages of a systematic arrangement for the periodical discussion of matters in dispute between masters and men. Boards of conciliation were of three kinds—mill committees, dealing with disputes in a particular factory only; joint committees of masters and men, representing the whole trade; and general boards, composed of employers and employed in all trades without distinction. Another type of mediation was the intervention of distinguished personages. This was specially useful when the only way to avoid or to end a strike was to make concessions which might seem to lower the dignity of those making them. But in cases in which the question at issue was one not of dignity but of hard cash, the mediation of public personages was likely to avail but little. He did not agree with those who considered that boards of conciliation were useless unless there was a provision for arbitration. But arbitration was frequently a most valuable method, and was in a large class of cases the only one by which disputes incapable of adjustment by negotiation ought to be settled. He gave numerous instances where it was perfectly practicable to have the dispute adjusted on equitable terms by arbitration; and wherever this was practicable, it was a sin and a shame to resort to the barbarous ordeal of a strike or a lock-out. Mr. Schloss concluded by saying it might be hoped that the development of Trade Union organization, coupled with the gradual growth of a higher social morality, would do much to prevent strikes.

The Huddersfield Gas Undertaking.—At a meeting of the Huddersfield County Borough Council last Wednesday, some discussion took place on the application of a portion of the depreciation fund to the payment of the cost of renewals and repairs of the gas plant. The Borough Accountant had laid before the Gas Committee a balance-sheet for the half year ended Dec. 31, 1892, showing a balance of £299 18s. 5d. profit, which it was decided should be transferred to the borough fund. On the motion for the confirmation of this resolution, Mr. Brook called attention to a resolution of the Committee to transfer £1500 from the depreciation fund, and apply it to the maintenance of works. This he contended was unbusinesslike, especially when they had only made a profit of £299 18s. 5d. for the half year. The Chairman of the Committee (Mr. Alderman Stocks) defended the procedure of the Committee, and said no man in his senses would think of paying for repairs and renewals out of capital. What, he asked, was the depreciation fund for but to resort to when they were called upon to renew their works? The gas-works were undergoing thorough restoration; and it was to the interest of the Committee as well as to that of the ratepayers generally that the capital account should not be increased. When the depreciation fund was exhausted, they would have to fall back upon capital; but he should not advise the latter course so long as the depreciation fund was available. A further question was asked as to the amount of the depreciation fund, and the rate at which depreciation was written off. Alderman Glendinning thought these questions ought not to be put unless there was some legitimate purpose to be served. The accounts of the borough ought not, he said, to be exposed in that way. Any member who wished for private information could, he added, get it by inquiry in the proper quarters; and no good purpose could be served by asking these questions in open Council. The matter then dropped.

The Defalcations of the Late Secretary of the East Ardsley Gas Company.—In the report of the Directors of the East Ardsley Gas Company for the half year ending Dec. 31 last, they state that the business had yielded a profit of £233, which would have been sufficient to pay a dividend of 5 per cent.; but owing to the defalcations of the late Secretary, whose deficiency amounted to £884, they recommend that no dividend be declared.

An Auxiliary Water Supply for Salisbury.—A contract for providing an additional supply of water for Salisbury is rapidly approaching completion. The contractors are Messrs. Batchelor, of Rochester; and they guarantee from the well they have constructed a supply of 70,000 gallons of water an hour. The old and new wells are connected at the bottom by a tunnel about 70 feet in length. The necessary engine, boiler, and pumps have been supplied by Messrs. Easton and Anderson; and when Messrs. Batchelor have concluded their contract, tenders will be invited for erecting a boiler and engine house and coal-stores. The total cost of the undertaking will be about £5000.

Gas Exhibition and Cookery Lectures at Sunderland.—An interesting exhibition of gas appliances for cooking, heating, and other domestic uses was recently opened in the Victoria Hall, Sunderland, by the Ex-Mayor (Mr. Alderman Shadforth, J.P.). It was promoted by Mr. J. G. Kirtley (a member of the Sunderland Town Council), and Messrs. Richmond and Co., Limited, of Warrington and London; and among those present at the inaugural ceremony was Mr. J. H. Cox, Engineer and Secretary of the Sunderland Gas Company. The Ex-Mayor remarked that he did not think gas-stoves had been so largely used in Sunderland as in some other towns; but he expressed the hope that there would be a greater demand for them as the result of the exhibition and the lectures which would accompany it. Having declared the exhibition open, he called upon Miss Owen to give the first of a series of practical lessons in cookery. These were continued twice daily for a week.

Projected Extensions at the Abergavenny Gas-Works.—An inquiry has lately been held at Abergavenny, by Mr. T. Codrington and Mr. E. P. Burd, on behalf of the Local Government Board, in regard to an application made by the Abergavenny Improvement Commissioners to enable them to borrow further capital for the extension of their gas-works, &c. Mr. J. B. Walford, the Commissioners' Solicitor, conducted their case. The sum applied for was £8000; and the proposed extensions comprised a double-lift gasholder and cast-iron tank, a 12-inch district governor, a station meter, four 16-feet purifiers, boiler, engine and exhauster, &c. Evidence was given by the Town Clerk (Mr. J. T. Rutherford) upon the financial position of the town; and by the Manager of the gas-works (Mr. S. Cross) upon the necessity of the extensions. It was suggested by a ratepayer present (Captain Williams) that, if certain large consumers were cut off, and the public lamps were put out at midnight, the outlay, if not altogether saved, could be very much reduced. In reply, Mr. Cross stated that, if the consumers named had been so dealt with during December last, it would have reduced the maximum 24 hours' make from 162,000 to 139,000 cubic feet, or about 44,000 cubic feet above the present storeage capacity of 95,000 cubic feet. Mr. Cross further remarked that one of the consumers mentioned by Captain Williams took during last year no less than 2,680,000 cubic feet; the Commissioners being under a binding contract to supply them until the year 1898. He thought by that date the normal increase in the town's demands would overlap the whole of the consumption referred to. The probable introduction of the electric light was also brought forward as a reason why the proposed outlay should not be entertained. Mr. Codrington said it was not desirable to reduce the amount for which borrowing power was sought, as it would still rest with the town to exercise it, and spend the money or not, when they had the Provisional Order. After further conversation, an inspection was made of the gas-works, and the inquiry terminated.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 307.)

Issue.	Share	When ex-Dividend.	Dividend on Issue.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	14 Oct.	10½	Alliance & Dublin 10 p. c.	10	17½–18½	..	5 13 6
100,000	10	,,	7½	Do. 7 p. c	10	12–13	+½	5 15 5
300,000	100	3 Jan.	8	Australian (Sydney) 5 % Deb.	100	104–106	..	4 14 2
100,000	20	30 Nov.	8	Bahia, Limited	20	11–12	..	13 6 8
200,000	5	16 Nov.	7½	Bombay, Limited	5	5¾–6¼	..	6 0 0
40,000	5	,,	7½	Do. New	4	4–4½	..	6 13 4
380,000	Stck.	12 Aug.	11½†	Brentford Consolidated	100	215–220	..	5 4 6
180,000	,,	,,	8½†	Do. New	100	168–173	..	4 18 3
220,000	20	15 Sept.	11½	Brighton & Hove Original	20	41–43	..	5 6 11
888,500	Stck.	31 Aug.	5	Bristol	100	103–106	..	4 14 4
320,000	20	29 Sept	11½	British	20	42–44	..	5 2 3
50,000	10	31 Aug.	11½	Bromley, Ordinary 10 p. c.	10	19–20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14½–15½	..	5 9 8
328,750	10	—	—	Buenos Ayres (New) Limited	10	7–8	..	—
200,000	100	3 Jan.	6	Do. 6 p. c. Deb.	100	99–101	..	5 18 10
150,000	20	12 Aug.	8	Cagliari, Limited	20	25–27	..	5 18 6
550,000	Stck.	14 Oct.	13	Commercial, Old Stock	100	242–247	..	5 5 3
165,000	,,	,,	10	Do. New do.	100	180–185	..	5 8 1
160,762	,,	15 Dec.	4½	Do. 4½ p. c. Deb. do.	100	122–127	..	3 10 11
800,000	Stck.	15 Dec	13	Continental Union, Limited	100	227–232	..	5 12 0
200,000	,,	,,	10	Do. 7 p. c. Pref	100	190–195	..	5 2 7
75,000	Stck.	15 Sept.	10	Crystal Palace District	100	185–190	..	5 5 3
486,090	10	27 Jan.	10	European, Limited	10	20–21	..	4 15 3
354,060	10	,,	10	Do. Partly paid	7½	14–15	..	5 0 0
5,596,560	Stck.	10 Feb.	12	Gaslight & Coke, A, Ordinary	100	220–225*	..	5 6 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	93–96*	..	1 3 4
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	260–265*	+2	3 15 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	115–120*	..	4 3 4
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	165–170*	..	4 8 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	165–169*	+2	1 2 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	260–265*	+3	3 15 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	152–157*	+1	3 16 5
1,061,150	,,	15 Dec.	4	Do. 4 p. c. Deb. Stk.	100	121–124	+1	3 4 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	127–132	+2	3 8 2
908,000	,,	,,	6	Do. 6 p. c. do	100	165–170	..	3 10 6
3,800,000	Stck.	16 Nov.	12	Imperial Continental	100	227–230	..	5 4 4
75,000	5	30 Nov.	6	Malta & Mediterranean, Ltd.	5	4¼–4¾	+¼	6 6 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	100	107–109	..	4 11 9
541,920	20	16 Nov.	5	Monte Video, Limited	20	13½–14½	–½	6 18 0
150,000	5	30 Nov.	10	Oriental, Limited	5	8–8½	..	5 17 8
60,000	5	29 Sept.	7	Ottoman, Limited	5	4–4¼	..	7 7 4
166,870	10	—	2	Pará Limited	10	2–2½	..	—
420,000	100	2 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	103–107	..	5 12 1
500,000	100	1 Dec.	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	—	10	San Paulo, Limited	10	8½–9½	..	—
500,000	Stck.	31 Aug.	15½	South Metropolitan, A Stock	100	293–298	+2	5 4 0
1,350,000	,,	,,	12	Do. B do.	100	247–252	+5	4 15 3
230,000	,,	,,	13	Do. C do.	100	250–255	+5	5 1 11
750,000	,,	13 Jan.	5	Do. 5 p. c. Deb. Stk.	100	143–146	..	3 8 6
60,000	Stck.	31 Aug.	11½	Tottenham & Edm'nton, "A"	100	225–230	..	5 0 0
				WATER COMPANIES.				
744,897	Stck.	30 Dec.	10	Chelsea, Ordinary	100	255–260	+2	3 16 11
1,720,252	Stck.	14 Oct.	8	East London, Ordinary	100	214–218	+3	3 13 5
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	141–144	..	3 2 6
700,000	50	15 Dec.	8½	Grand Junction	50	107–111	..	3 16 7
708,000	Stck.	10 Feb.	11	Kent	100	276–281*	..	3 18 3
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	238–243	+1	3 18 2
406,200	100	,,	7½	Do. 7½ p. c. max.	100	195–200	..	3 15 0
285,000	Stck.	29 Sept.	4	Do. 4 p. c. Deb. Stk.	100	125–130	..	3 1 6
500,000	100	10 Feb.	12½	New River, New Shares	100	323–328*	+2	3 14 0
1,000,000	Stck.	27 Jan.	4	Do. 4 p. c. Deb. Stk	100	131–134	..	2 19 8
902,300	Stck.	15 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	160–165	..	3 18 9
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	145–150	..	4 6 8
1,155,066	Stck.	15 Dec.	10	West Middlesex	100	250–255	+3	3 18 5

*Ex Div.

† Next dividend will be at this rate.

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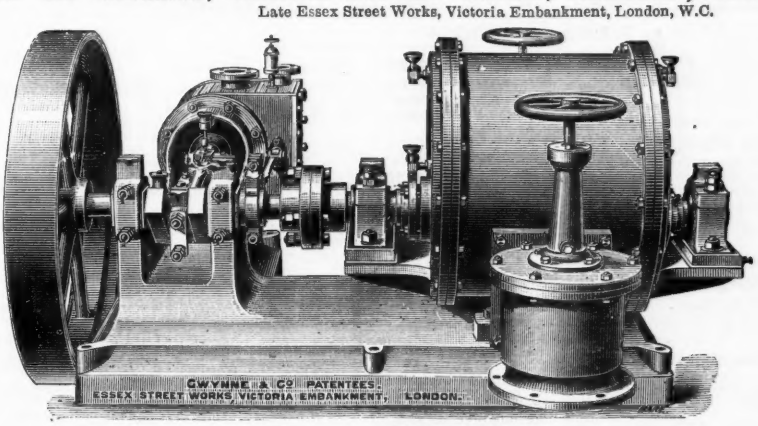

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Applications, with reference from last Employers, to be addressed to the MANAGER, Gas-Works, Romford, ESSEX.

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WANTED, by the Ellesmere Local Board, a WORKING MANAGER for their Gas-Works (make 4 to 5 millions per annum). Wages, 30s. per week, with House, Coal, and Gas free.
The person appointed will be required to enter on his duties on the 25th of March next.
Sealed applications for the Situation (in Applicant's own handwriting, and accompanied by not more than Three Testimonials of recent date) to be sent to me, the undersigned, on or before Saturday, the 25th inst., endorsed on Envelope "Application for the Office of Gas Manager."
JOHN PAY,
Clerk to the Board.
Local Board Offices, Ellesmere,
Feb. 14, 1893.

BOROUGH OF BEVERLEY GAS-WORKS.

THE Corporation of Beverley invite APPLICATIONS for the post of MANAGER of the Borough Gas-Works. The Salary will be at the rate of £150 per annum with Residence, Coal, and Gas free.
The Manager will be required to give the whole of his time to the duties of the Office, and to enter upon them not later than the 1st of May next.
Applications, stating age and previous experience, and accompanied by not more than Three Testimonials must be sent to me not later than the 11th of March next.
Directly or indirectly canvassing the Members of the Corporation will disqualify for the appointment.
By order,
JAMES MILLS,
Town Clerk.
Beverley,
Feb. 18, 1893.

TWO Second-hand Purifiers Wanted, 10 ft. long, 6 or 7 ft. wide, and 5 ft. deep, or Price, with Specification, for new ones.
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56 Oval Retort Mouthpieces, 20 in. by 15 in., complete, with loose Steel Lids, Cross-Bars, and Screws.
56 6-inch Cast-Iron Ascension-Pipes, tapering to 5 inches diameter at top.
56 H-Pipes, 5 inches diameter inside, with three loose Caps on each.
56 5-inch diameter Dip-Pipes.
4 Lengths of Hydraulic Main, semi-circular bottom, size 25 in. by 24 in., made of ⅜-inch Wrought-Iron Plate, with ½-inch end and top Plate, each length being 19 feet long.
12 Cast-Iron Hydraulic Main Standards.
4 10-inch Gas-Valves.
18 Cast-Iron Wall Brackets for 10-inch Gas-Pipes.
10 Cast-Iron and 8 Wrought-Iron Buckstays, each about 12 feet long.
The above can be seen on application at the Gas-Works; and any further information may be obtained from the Engineer (Mr. J. F. Bell), Gas Offices, Stafford.
MATT. F. BLAKISTON,
Town Clerk.
Feb. 1, 1893.

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FOR SALE—Rectangular Station Meter. Capacity 19,000 cubic feet per hour; 12-inch Connections.
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FOR SALE—A perfectly new 20,000 cubic feet per hour EXHAUSTER, with Steam-Engine combined, including Hydraulic Gas Governor, Bye-Pass Valves, and Connections.
For further particulars, apply to Mr. T. G. MARSH, 41, Corporation Street, MANCHESTER.

FOR SALE—Two Purifiers, 15 ft. by 10 ft. with two 14-inch Four-way Valves and Connections (C. & W. Walker).
Two PURIFIERS, 20 ft. by 10 ft.
One 14-inch CENTRE-VALVE (C. & W. Walker).
The above are displaced solely through Extensions, and can be sold in one lot or separately.
Any further information may be obtained by applying to CHAS. H. KAY, Secretary, Gaslight Company, Douglas, ISLE OF MAN.

FROME GAS COMPANY.

THE Directors of the above Company offer FOR SALE by TENDER, one SINGLE-LIFT GASHOLDER, as now erected. Size, 49 ft. by 15 ft., with eight Cast-Iron Columns, and Wrought Girders.
Further particulars may be obtained of the undersigned, to whom tenders are to be sent before March 10, marked "Tender for Holder."
H. F. VINCENT,
Manager.
Feb. 16, 1893.

BICESTER GAS-WORKS.

THE Bicester Gas, Coke, and Coal Company are prepared to LET their WORKS for the Term of Seven Years, from the 25th day of March, 1893, and hereby invite TENDERS for the taking of the same.
Applicants are requested to apply to me at my Office, in Bicester, Oxon, for the terms of letting; and sealed tenders, subject to such terms, are to be delivered to me, on or before the 4th day of March, 1893.
The Directors do not pledge themselves to accept the highest or any tender.
By order,
GORDEN WALSH,
Secretary.
Bicester, Oxon,
Feb. 1, 1893.

BOROUGH OF NEWBURY.

THE Gas Committee are prepared to receive TENDERS for the TELESCOPING of a GASHOLDER, 80 feet in diameter.
Plans and Specifications may be seen, and all Information obtained at the Gas-Works.
Tenders, endorsed "Tender for Gasho'der," and addressed to the Chairman of the Gas Committee, Gas-Works Office, Newbury, to be delivered not later than Wednesday, the 8th day of March, 1893.
The Gas Committee do not bind themselves to accept the lowest or any tender.
By order,
ROBERT M. COUPER,
Manager.
Corporation Gas-Works,
Newbury, Feb. 18, 1893.

COCKERMOUTH LOCAL BOARD.

THE General Purposes Committee of the above Local Board invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Works during Twelve Months commencing the 1st of April next.

Tenders, endorsed "Tar and Liquor," to be sent in not later than the 6th of March next.

ER W. SMITH,
Gas Manager.

Feb. 18, 1893.

TO IRONFOUNDERS AND RETORT MAKERS.

THE Market Harborough Gas Company ask for TENDERS for the following: 419 yards of 4-inch GAS-PIPES; 425 yards 3-inch do.; 20 lengths of 6-ineh do. (turned and bored), with recess in front for lead, and to be cast vertically; together with the usual SPECIALS.

Also 30 RETORTS, BRICKS, and CLAY, particulars of which may be had from Mr. F. Armitage, Manager.

Tenders to be sent to Mr. William Gilbert, Market Harborough, by the 28th inst.

CHAS. BURGOINE,
Secretary.

Feb. 11, 1893.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO RETORT SETTERS.

THE Directors of the above Company are prepared to receive TENDERS for the erection of Six SETTINGS of Six RETORTS each, at the Gas-Works, Guildford.

Tenders to include all Labour, Fire-Clay Goods, Ironwork, and other Material required, including Fire-Bars, Door-Frames, Mouthpieces, and all Fittings, Ascension, Cross, and Dip Pipes, and Hydraulic Mains; also the required Valves, Pipes, Connections, and other Material and Labour for connecting up to the present apparatus, and the leaving of the whole in perfect working order.

To be of the same design as the present Settings, which may be inspected on application to Mr. Lloyd, Gas-Works Manager, Guildford.

Tenders to be endorsed "Retorts," and to be delivered to the Chairman of the Gas Company, Guildford, on or before Tuesday, Feb. 28 inst.

By order,
WILLIAM LONGWORTH,
Secretary.

Gas Offices, Guildford,
Feb. 11, 1893.

CORPORATION OF ROTHERHAM.
(GAS DEPARTMENT.)

TO GASHOLDER MAKERS.

THE Gas Committee invite Tenders for CONVERTING a TWO-LIFT TELESCOPIC GASHOLDER into one of FOUR LIFTS. The diameter of the present Outer Lift is about 127 feet.

The Drawings and Specification may be seen at the Gas-Works, Rotherham, on application to the Engineer, Mr. C. B. Newton, from whom may be obtained copies of the Bill of Quantities on deposit of Two Guineas, which will be returned on receipt of a *bonâ-fide* tender.

The Contractor whose tender may be accepted by the Corporation is required to pay his workmen (whether Artisans or Labourers) not less than the minimum standard rate of wages paid in Rotherham and district for the time being in each branch of trade, and to observe the recognized hours and proper conditions of labour.

Tenders to be delivered (sealed) at the Town Clerk's Office, Rotherham, not later than Monday, the 27th inst., endorsed "Tender for Gasholder."

By order,
H. H. HICKMOTT,
Town Clerk.

Council Hall, Rotherham,
Feb. 9, 1893.

BRIGHOUSE LOCAL BOARD.

STATION GOVERNOR.

THE Brighouse Local Board are pre- pared to receive TENDERS for the supply and delivery and fixing of a new STATION GOVERNOR for 24-inch Main at the Gas-Works, Brighouse.

Further Particulars and Form of Tender can be obtained on application to the undersigned.

Sealed tenders, endorsed on the outside "Station Governor," are to be sent in, addressed to Frederick Laxton, Esq., Chairman of the Local Board, Public Offices, Brighouse, on or before Tuesday, the 28th day of February, 1893.

The lowest or any tender not necessarily accepted.

JAMES PARKINSON,
Engineer and Manager.

Public Offices, Brighouse,
Feb. 10, 1893.

BRIGHOUSE LOCAL BOARD.

PIPE FOUNDERS.

THE Brighouse Local Board are pre- pared to receive TENDERS for the supply and delivery, carriage paid, at Brighouse Railway Station, or Calder and Hebble Canal Wharf, of a quantity of CAST-IRON GAS-MAINS and SPECIAL PIPES.

Approximate quantity—

160 yards 24-inch dia. Socket and Spigot Pipes.
380 " 20 " " " "
40 " 18 " " " "
320 " 12 " " " "

The Special Pipes are Governor Connections, Tees, Branches, Elbow Syphons, &c.

Further Particulars and Form of Tender can be obtained on application to the undersigned.

Sealed tenders, endorsed on the outside "Gas-Mains," are to be sent in, addressed to Frederick Laxton, Esq., Chairman of the Local Board, Public Offices, Brighouse, on or before Tuesday, the 28th day of February, 1893.

The lowest or any tender not necessarily accepted.

JAMES PARKINSON,
Engineer and Manager.

Public Offices, Brighouse,
Feb. 10, 1893.

DARWEN CORPORATION GAS-WORKS.

RETORTS, BRICKS, CLAY, ETC.

THE Gas Committee of this Corporation are prepared to receive TENDERS for all the RETORTS, BRICKS, BLOCKS, FIRE-CLAY, &c., required at these Works during the ensuing season.

Full particulars may be had on application to

THOS. DUXBURY,
Engineer and Manager.

Gas-Works, Darwen,
Feb. 11, 1893.

CITY OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive, on or before Wednesday, the 15th day of March next, OFFERS of high-class CANNELS and COALS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years.

Particulars and printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Feb. 10, 1893.

TENDERS FOR COAL.

COMMERCIAL GAS COMPANY.

THE Directors are prepared to receive TENDERS for the supply of 220,000 tons of clean, dry, unscreened, fresh wrought GAS COALS, delivered f.o.b. to the Company's Steamers, at any suitable Port, during the Year ending the 31st of July, 1894.

The deliveries to be in equal monthly quantities throughout the Year.

Payment in cash monthly.

Parties desiring to tender for more than One Year must state separately the price and quantity offered for each Year.

Particulars and Forms of Contract may be obtained from the Engineer, Mr. H. E. Jones.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, sealed, and endorsed "Tender for Coals," to be addressed to the Chairman of the Coal Committee, and delivered at the Company's Offices not later than Twelve o'clock on the 22nd of February, 1893.

Commercial Gas-Works, Stepney, E.

BOROUGH OF BURTON-UPON-TRENT.

ELECTRIC LIGHT.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS from competent persons for the construction and erection of the BUILDINGS required for the Boilers, Engines, Dynamos, &c., at the proposed Electric Light Works in Wetmore Road, in the said Borough.

Full Particulars and Copies of the Conditions, Specification, and Bill of Quantities, with the Form of Tender, may be obtained and the Drawings viewed, on payment of Five Pounds (which will be returned on receipt of a *bonâ fide* Tender, with the Bill of Quantities fully priced out), on application to the Engineer, Mr. F. L. Ramsden, Gas-Works, Burton-upon-Trent.

Sealed tenders, endorsed "Electric Light Buildings," are to be delivered to me at or before Ten a.m. on Saturday, the 25th of February inst.

The Council do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

No tender will be accepted from any party who pays to his or their employees, whether artizans or labourers, less than the standard rate of wages paid in this Borough, or who does not conform to the hours and conditions of labour generally recognized in each branch of industry affected; and clauses to ensure compliance with this regulation are inserted in the Conditions of Contract.

T. N. WHITEHEAD,
Town Clerk.

Burton-upon-Trent,
Feb. 1, 1893.

BOROUGH OF BURTON-UPON-TRENT.

ELECTRIC LIGHT.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS from competent persons for the construction and erection of the WROUGHT IRON ROOFS, &c., required for the Buildings for the Boilers, Engines, Dynamos, &c., at the proposed Electric Light Works, in Wetmore Road, in the said Borough.

Full Particulars, and Copies of the Conditions, Specification, and Bill of Quantities, with the Form of Tender, may be obtained and the Drawings viewed, on payment of Two Pounds (which will be returned on receipt of a *bonâ fide* Tender, with the Bill of Quantities fully priced out), on application to the Engineer, Mr. F. L. Ramsden, Gas-Works, Burton-upon-Trent.

Sealed tenders, endorsed "Roofs, &c., for Electric Light Buildings," are to be delivered to me at or before Ten a.m. on Saturday, the 25th of February inst.

The Council do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

No tender will be accepted from any party who pays to his or their employees, whether artizans or labourers, less than the standard rate of wages paid in this Borough, or who does not conform to the hours and conditions of labour generally recognized in each branch of industry affected; and clauses to ensure compliance with this regulation are inserted in the Conditions of Contract.

T. N. WHITEHEAD,
Town Clerk.

Burton-upon-Trent,
Feb. 1, 1893.

HAWORTH LOCAL BOARD OF HEALTH.

THE above Local Board are prepared to receive TENDERS for the purchase of surplus TAR and AMMONIACAL LIQUOR from March 26 1893, to March 25, 1894, delivered on Rails at Haworth Railway Station.

Tenders, marked "Tar and Liquor Tender," to be sent to me the undersigned not later than Thursday March 2, 1893.

WM. ROBERTSHAW,
Clerk to the Board.

5, Temple Street, Keighley.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is hereby given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Monday, the 27th day of February inst., at Six o'clock precisely, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare Dividends, and for General Business.

The Transfer Books will be closed from the 13th to the 27th of February, 1893, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices: At the Works, Bromley,
Kent, Feb. 10, 1893.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is hereby given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 25th day of February inst., at Three o'clock in the Afternoon precisely, to receive the Report of the Directors, the Statement of Accounts for the Half Year ended the 31st day of December, 1892, to declare a Dividend, and transact such other Business as the Act of Parliament directs.

The Transfer Books will be closed from Saturday the 11th, until Tuesday, the 28th inst.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company, Willoughby Lane,
Tottenham, Feb. 10, 1893.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is hereby given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, the 3rd of March, 1893, at Two o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1892, to declare Dividends, to elect Directors, to appoint a Special Auditor, and for other purposes.

The Transfer Books of the Company will be closed from the 18th of February to the 3rd of March, both days inclusive.

By order,
W. H. HARDY,
Secretary.

Offices: 5, Great Winchester Street,
London, E.C., Feb. 11, 1893.

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Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
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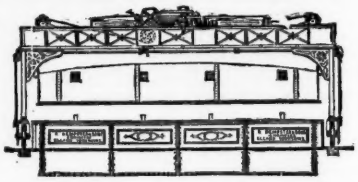

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Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

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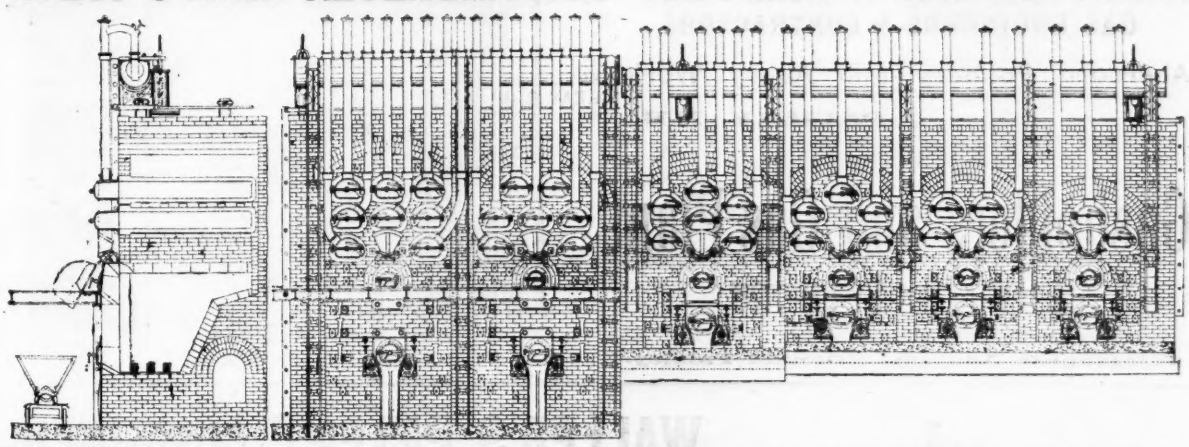
HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE ADAPTED TO THE REQUIREMENTS OF ALL GAS COMPANIES AND GAS CORPORATIONS, AND HAVE ALREADY BEEN EXTENSIVELY ADOPTED. THEY ARE ERECTED UPON BOTH THE WORKING-STAGE AND SHALLOW-CHAMBER SYSTEMS, AND EQUALLY SATISFACTORY RESULTS ARE GUARANTEED IN BOTH CASES.

THE SETTINGS HAVE ATTAINED TO A MEASURE OF SUCCESS AND POPULARITY QUITE UNEQUALLED BY THAT OF ANY OTHER WITHIN THE SAME SPACE OF TIME. THE WORKING RESULTS OBTAINED, AND THE GENERAL SATISFACTION GIVEN, ARE DECLARED IN EVERY CASE TO EXCEED, AND IN MOST CASES CONSIDERABLY EXCEED, THE PATENTEE'S GUARANTEE. THE CONSTRUCTION AND WORKING OF THE PATENT PRODUCER AND THE PATENT CHARGING APPARATUS FOR SAME ARE ABSOLUTELY UNIQUE AND UNRIVALLED, AND ARE THE DELIGHT OF EVERY STOKER; WHILE IN EVERY OTHER PARTICULAR THEY SECURE THE HIGHEST RESULTS ATTAINABLE BY ANY REGENERATIVE SYSTEM, AND AT A MINIMUM OF COST.

Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings, or complete erection undertaken if required, and carried out by specially Trained Workmen.

Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stewart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge, and from R. F. HISLOP (son of Patentee), Gas-Works, Paisley.

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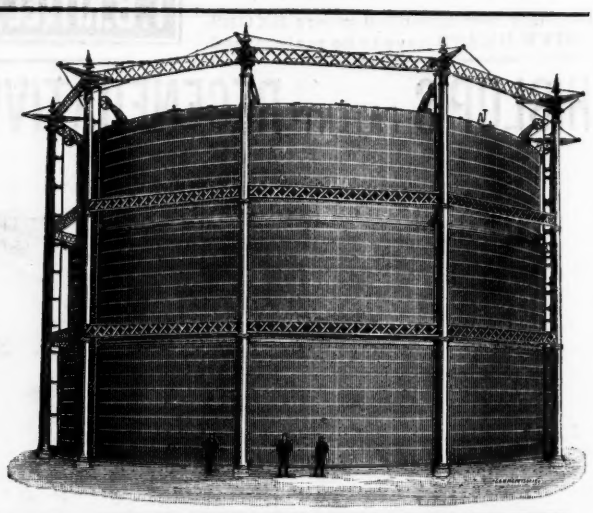

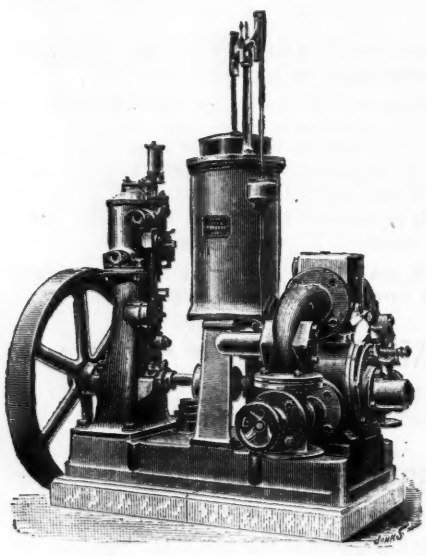

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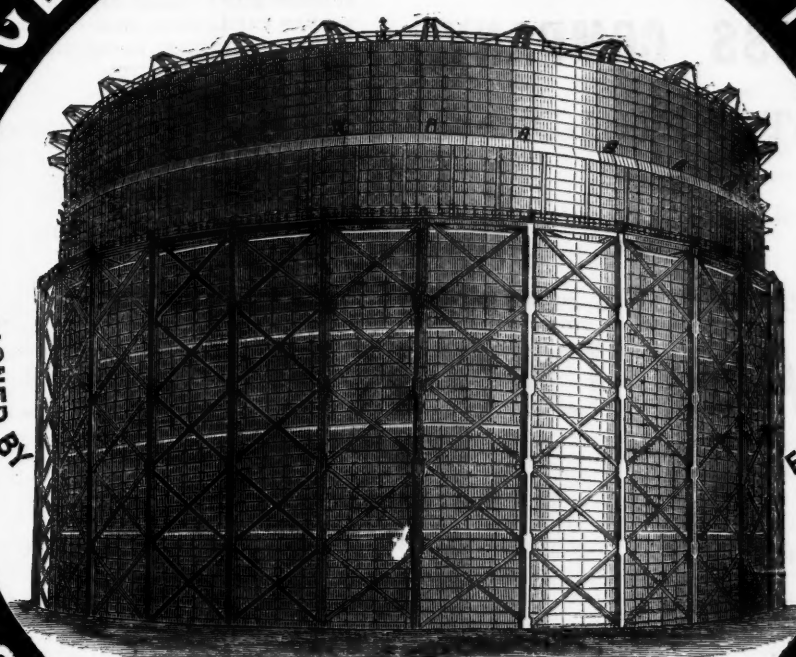

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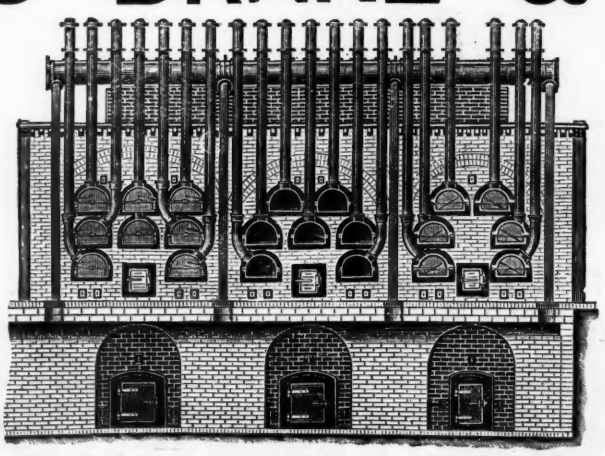

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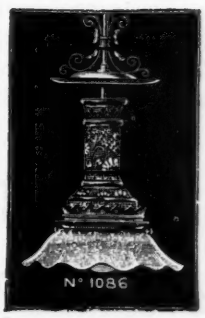

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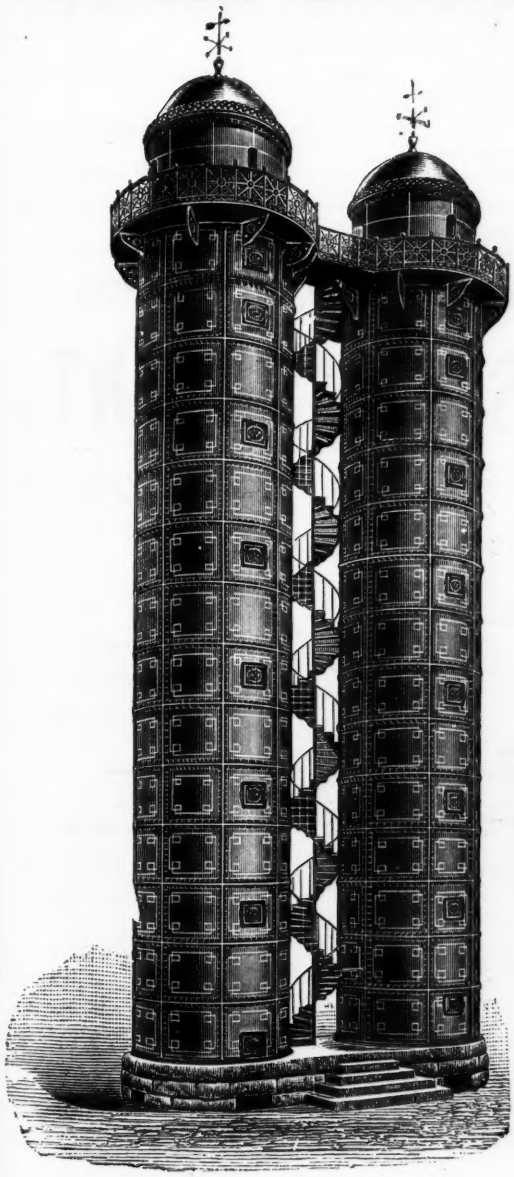

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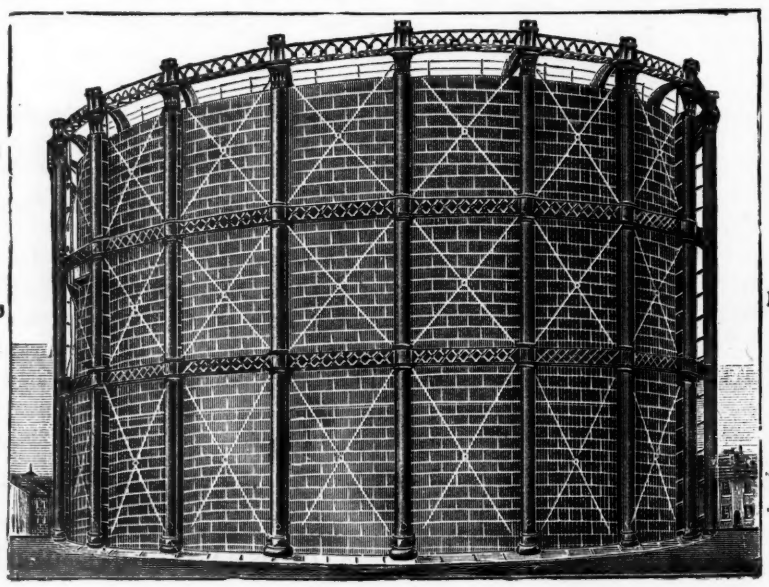

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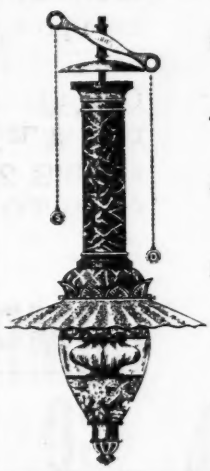
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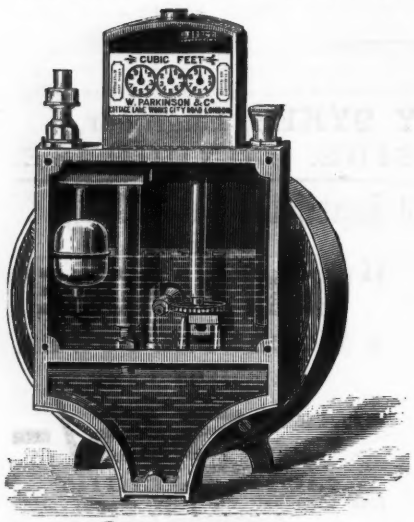

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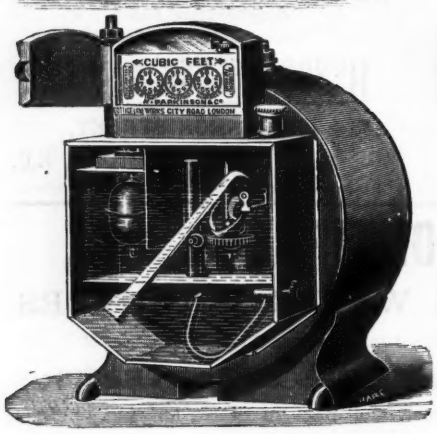

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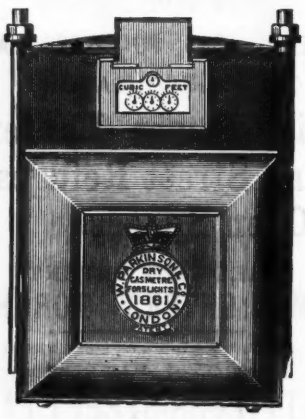

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[See also Advt., p. 304.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Feb. 21, 1893.